

THE MODEL ENGINEER



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The MODEL ENGINEER

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Greetings

IT was the custom of the late Mr. Percival Marshall, at this season of the year, to publish a Christmas Greeting to readers, for he was proud of the personal, friendly bond that existed between himself and model engineers everywhere. Those of us whose privilege it is to succeed Mr. Marshall in the task of editing and producing THE MODEL ENGINEER are no less proud of that mutual friendship which we hope and believe will continue to endure and mature ; it is an ever-present inspiration to us, and we value it very highly.

Therefore, we take this opportunity of extending to our readers our best wishes for Christmas and the New Year. Austerity conditions still continue to harass us in many ways, but not, perhaps, quite so severely as in recent years ; but at Christmas-time we endeavour to forget our worries for a little while and turn to more pleasant thoughts.

In this issue will be found some items which, we hope, will help to add a little pleasure and amusement to the leisure which most readers will be enjoying during the next day or two ; in short, we have included something "in lighter vein" so that we may not all become too serious in our hobby.

A little fun occasionally does no harm, but

it almost always does some good, provided that it does not take the form of reckless practical joking. We hope that readers will find the lighter contents of this issue interesting and even useful.

Model engineering everywhere continues to attract new adherents, which is a good sign ; for it means, above all, that it appeals to the natural craftsman as a ready method of indulging his creative instincts. Our advertisement pages show clearly that our friends in the trade are doing everything possible to meet the ever-growing need for tools and materials which the model engineer must have if he is to make anything ; the demand for drawings and practical books is always increasing, while descriptions and illustrations of models of all kinds, together with explanations of how the models were, or can be, made, are a never-ending source of inspiration, interest and encouragement to other people.

THE MODEL ENGINEER has its rightful place in the general development of our hobby, a place which it has occupied for more than fifty years, and a place which those of us whose duty it is to conduct it intend that it shall continue to occupy in the future, and we trust that we may enjoy that friendly co-operation from readers, so potent a force in the past and so essential for the success of our plans.

SOME "EMETT" MODELS

A Seasonable Break-away into the Realms of Fantasy

OUR esteemed contemporary, *Punch*, long ago won for itself such widespread favour as to establish itself as a national institution, and its good-natured wit and fun have embraced every phase of our national life. From the earliest volumes, railways have figured frequently in its pages; but we are probably not alone in

Emmett's good-natured and wholesome sense of humour, even when the result is the creation of the weirdly grotesque locomotive and coaches which made up the 11.50 p.m. train on the night when, apparently contrary to instructions, it took the route *via* Witch Hollow!

There can be little cause for surprise that,



By courtesy]

Mr. V. H. Messer's 2½-in. gauge "Nellie" with her coach

[*"The Model Craftsman"*]

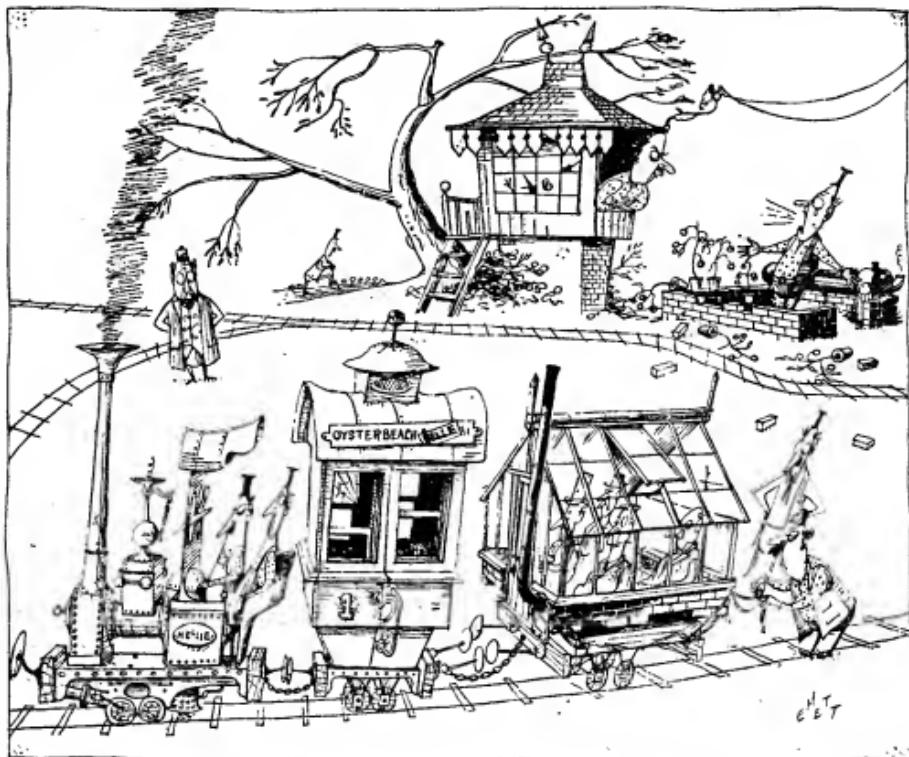
thinking that none of the railway cartoons and jokes has given more unadulterated pleasure than have the fantastic creations of Rowland Emett, whose unique drawings now appear so often in *Punch*'s pages. To all who take any interest in railways, and can enjoy a good joke with a "railway" flavour, the name "Emett" has become a household word.

The chief butt of Emett's inspired pen is the independent minor, or light railway which winds its way, almost aimlessly and unconcernedly, through the remoter recesses of the English countryside. Such railways, however, are becoming rare, due to the incursions of modern road transport facilities; but in their time, the light railways have served the community well, albeit that their locomotives, rolling-stock, equipment and, often, their personnel have usually been of the most antiquated description.

It is the generally-antique character of the English light railway that has so often provoked

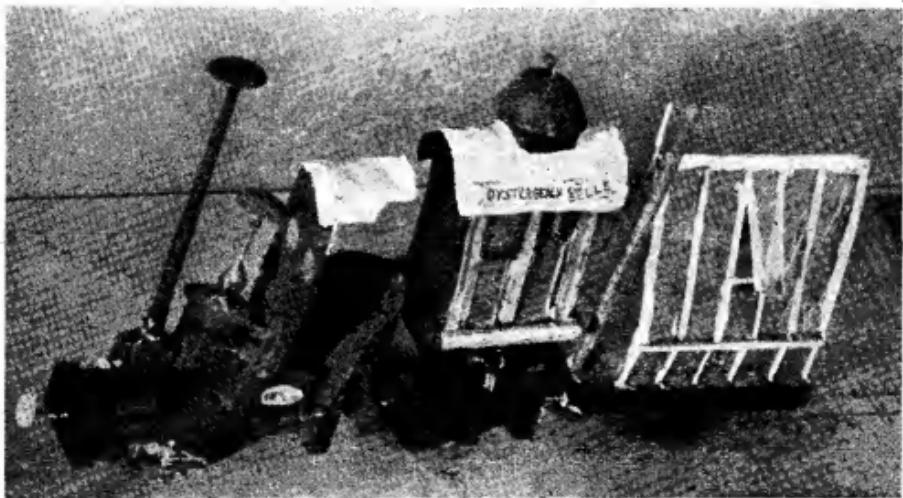
in due course, Emett's drawings should have stirred the imagination of model-makers, some of whose work is illustrated herewith. The first example to come to our notice was a 2½-in. gauge version of *Nellie*—a typical specimen of Emett's design—coupled to an appropriate coach. These two models were built by Mr. V. H. Messer, a South Australian reader of the "M.E.", who has provided the following particulars:—

Engine. Length over centre couplings, 13 in.; height from rails to top of chimney, 11 in.; gauge, 2½ in.; diameter of wheels, 1½ in.; cylinders, ½ in. bore, ¾ in. stroke; slip-eccentric valve-gear; boiler, 2 in. diameter, 2½ in. long; firebox wrapper, 2½ in. by 2 in.; inner firebox, 2 in. by 1½ in.; five tubes ¾ in. diameter; grate area, 3 sq. in. and working pressure, 100 lb. per sq. in. The cab fittings include: regulator, water-gauge, pressure-gauge and blower-valve. The engine is coal-fired. At the moment of writing, a full-size version of *Nellie* is appearing

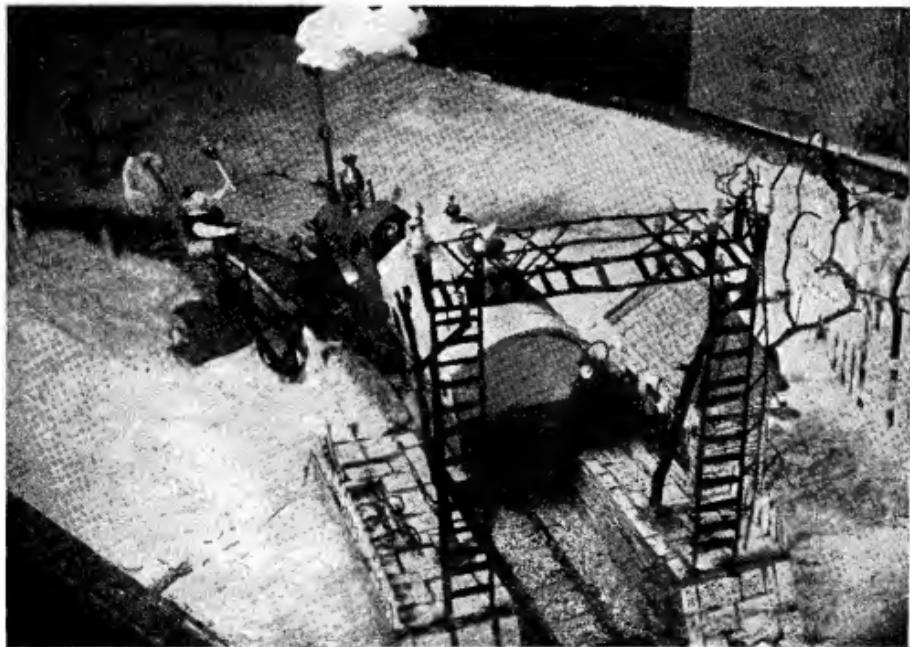
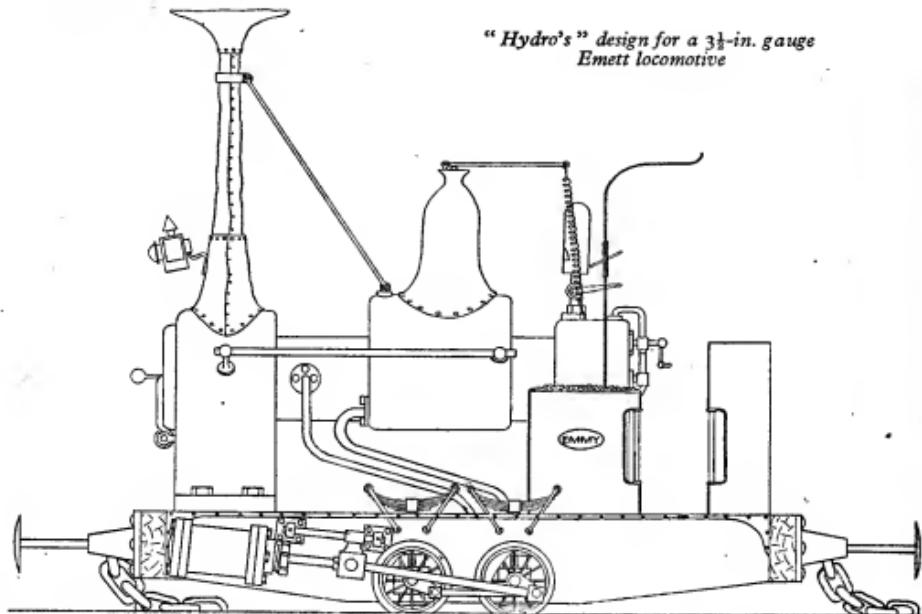


Reproduced by permission of

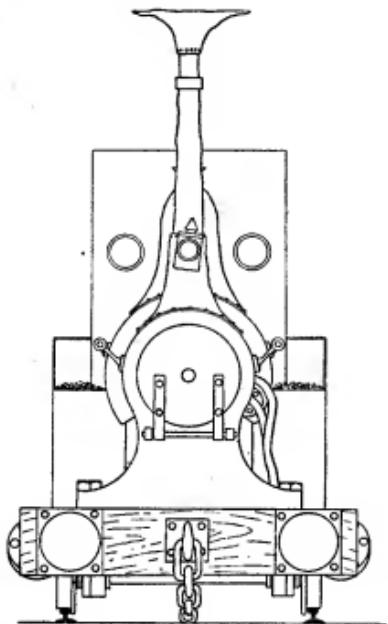
[The Proprietors of "Punch"]
"A plague on the 'Devon Belle' and its new glass observation coach!"



Mr. W. H. Hart's model of the "Devon Belle" drawing



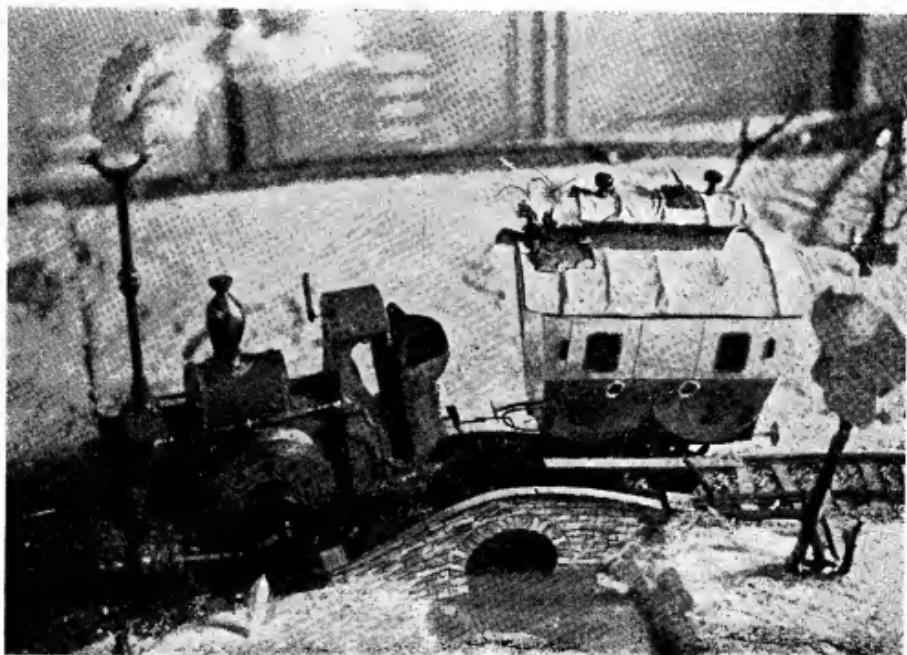
"Antimacassar" receiving the "All Clear!"



in "Oranges and Lemons," the revue at the Lyric Theatre, London.

Coach. Length over buffers, 10 in. ; wheels 1 in. diameter. The body contains a feedwater tank and pump and is built almost entirely of aluminium.

Next came a drawing from a reader in the Royal Navy, who desires to hide his identity behind the name "Hydro." The drawing depicts a 0-4-0 saddle-tank named *Emmy* which, while it is not an exact copy of any of Emett's engines, is sufficiently characteristic to make the source of its inspiration obvious. "Hydro" wrote : "Emmy is an attempt to translate into Small Locomotive Practice one of Mr. Emett's fantasies in *Punch*. Whoever heard of *Punch* and THE MODEL ENGINEER having anything in common ? However, I am prepared to be the (missing) link ! I quite realise that you will need all your courage should you choose to print the drawings. [We have hoped, for a long time, that some sort of opportunity might arise to justify their publication.—Ed., "M.E."] . . . Here are the leading suggested dimensions and a few details : Cylinders (2), $\frac{1}{2}$ in. bore, $\frac{1}{4}$ in. stroke (piston-rods) should be scored very lightly to produce a perpetual 'blow' at the gland ; driving-wheels, 1 in. diameter ; slide-valves driven by slip-eccentrics ; wheelbase, $1\frac{1}{2}$ in. (should negotiate a soup-plate) ; boiler, $1\frac{1}{2}$ in. external diameter ; one superheater tube $\frac{5}{16}$ in. diameter ; five or six fire-tubes $\frac{1}{4}$ in. diameter



"Antimacassar" and train negotiating an under-bridge

(water to be kept well up in glass ; the more she primes, the merrier) ; plate-work should be easy for any tyro ; the more 'hammer-bashed' it comes out, the better (or worse) *Emmy* will look. The coupling chains hang down because the driver likes to hear them jangling on the ballast. I have shown no cobwebs ; he isn't that lazy ! It is in a spirit of admiring deference to Mr. Emett that I have given *Emmy* her name." [We were distinctly disappointed to read that last sentence ; in our egotistical pride, we had thought the name was a play upon the well-known initials "M.E."—Ed., "M.E."]

Then, at the Model Railway Exhibition last Easter, we found a small-scale "solid" (non-working) model built by Mr. W. H. Hart, depicting *Nellie* and coach plus a truck on which is mounted an ordinary garden green-house. This model is copied from a drawing of Emett's, the caption to which read : "A plague on the 'Devon Belle' and its new glass observation coach !" By kind permission of the Proprietors of *Punch* we reproduce this drawing so that readers can compare the train with Mr. Hart's model of it.

Not long ago, Emett, in collaboration with his wife, published "Anthony and Antimacassar," a book for children. In this book, published by Faber & Faber Ltd., is set forth an account of the strange and wonderful adventures of a little china pig, named Anthony, and a very special, but essentially grotesque locomotive named *Antimacassar*. This engine is not quite like any of its creator's other "designs," in that it is a 4-2-2 type express passenger saddle-tank locomotive and, therefore, far more important than any other ! At least, *Antimacassar* himself seems to think so. Quite recently, the story in this book was televised, with the aid of models, and we understand that a film is to be made of it.

The model of *Antimacassar* is a very faithful reproduction of the original drawings, and its portrait adorns [?] the cover of this issue. It is electrically driven and runs on "O" gauge track. Two photographs, which were taken on the layout used for the television broadcast, are reproduced herewith, and they will convey some idea of the delightful fantasy that pervades the whole story. By the way, the driver of *Antimacassar*, Mr. Stuffingbox, is a Very Important Person who will stand no nonsense from anybody—not even the Directors of the Railway ! His engine, too, will allow nothing to stand in the way ; for example, if bridges are too low to pass under, then they are just pushed out of the way by the engine's funnel ! All this was duly incorporated in the models, adding much to the amusement of the story. The vegetation apparent on the coach is explained by the fact that Mr. Stuffingbox is a keen gardener, and, since his duties on the railway left him no time for his hobby, he transplanted his garden to the roof of the coach, so that he could tend it while on duty !

The track on this layout is apparently arranged for two-rail operation ; there are not *too* many sleepers to the yard, and they do not seem to be over-concerned about lying exactly at right-angles to the rails.

What signalling there is appears to be on an entirely novel plan, in that the solitary signal is held up and waved by the signalman when he wants the train to start. But we rather gather that *Antimacassar* is much too important to bother very much about signals.

The models and the layout were made by Mr. R. V. Forster, Studio Manager of a well-known advertising firm and a keen model engineer.

We gratefully acknowledge the help given by Mr. Emett while this article was being prepared.

EXHIBITION



Our judges—

FLASHBACK



are renowned for their integrity

MYSTERY CRUISER!

by W. J. Hughes

AS soon as I saw her I fell for her—a statement which has taken a good many men into trouble one way or another! She had slim, racy lines, her stern was shapely and beautifully rounded, her profile was lovely, and her curves were delightful. But, oh! what a condition she was in! And when I took her home, of course the Missus wanted to know where she was going to be kept!

and I was assured that it was a scale model of Her Majesty's Cruiser *Rainbow*, built in 1891. At the same time, though, I had lent to me a catalogue of Palmer's, which contained a photograph of *Rainbow*.

Comparison of the two will show that there are many points of difference between the model and *Rainbow*. Shall we note a few?

(a) Prow of model has more pronounced

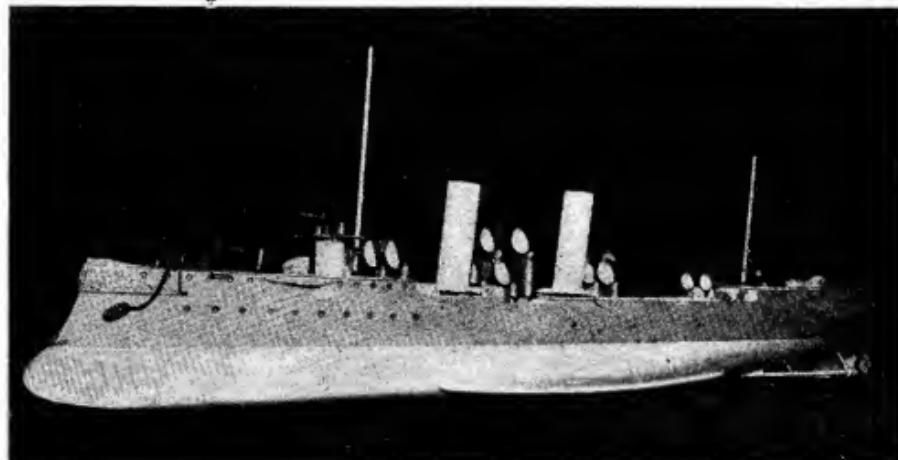


Photo No. 1. The model—of a light cruiser of the 1880-90 period, built at Palmer's Jarrow shipyard.
Note the large vents, typical of the period

Seriously, though, this model cruiser had been so badly treated that it was difficult to know what to do with her. One thing was certain—I couldn't let her go to the dustmen, as was her threatened fate—that would have been sacrilege. Perhaps something would turn up, for in an ordinary modern house (which was already fairly well cluttered up with models) it was clearly impossible to keep for long a six-foot cruiser.

So home we went, and the model went into the workshop for a time. Even here she was in the way, but it was nice to look at her and to imagine her in her pristine glory, when she was kept in a showcase and had no idea that fifty years later she would be filthy and disreputable with fittings smashed and missing, stanchions broken, masts snapped off short, and rigging trailing from end to end of her formerly trim decks.

This model originally came from the offices of Palmer's Shipbuilding and Iron Co. Ltd., of Jarrow, where it had been one of the show models normally kept by shipbuilders. It was built, in all probability, more than half-a-century ago,

curve, has single torpedo-tube just above the waterline, and is decorated with scroll-work.

(b) Model has gun-recesses in hull near both bows and stern; *Rainbow* has them near bows only.

(c) Model has only two quick-firing guns protruding from each side of main deck bulwarks; *Rainbow* has three much larger weapons, plus one quick-firing gun.

(d) Model has ordinary cambered foredeck; *Rainbow* appears to have turtle-deck.

(e) Model has no breakwater on foredeck *Rainbow* has.

(f) Main armament of model appears larger than that of *Rainbow*, though obviously of smaller calibre.

(g) In the model, conning-tower is "single-storey," with platform above carrying searchlight and two quick-firing guns. In *Rainbow*, conning-tower has house on this platform, with searchlight and quick-firer on roof of this.

(h) Ventilators of model appear to be much larger in proportion to size of ship than those of prototype.

(i) Funnels of *Rainbow* are much taller in

proportion to height of conning-tower platform, and have escape-pipes on fore-side, with platform halfway up forward funnel. Model has escape-pipes aft of funnels, and no platform.

(j) Masts of model are much thicker in proportion to size of ship than those of prototype.

(e) the model is that of a substantially *smaller* vessel than *Rainbow*.

Thirdly, that since our model has the scroll-work and *Rainbow* has not, the former is a representation of an *earlier* ship than the latter. *Rainbow* and her sister ships *Pique* and *Retribution*

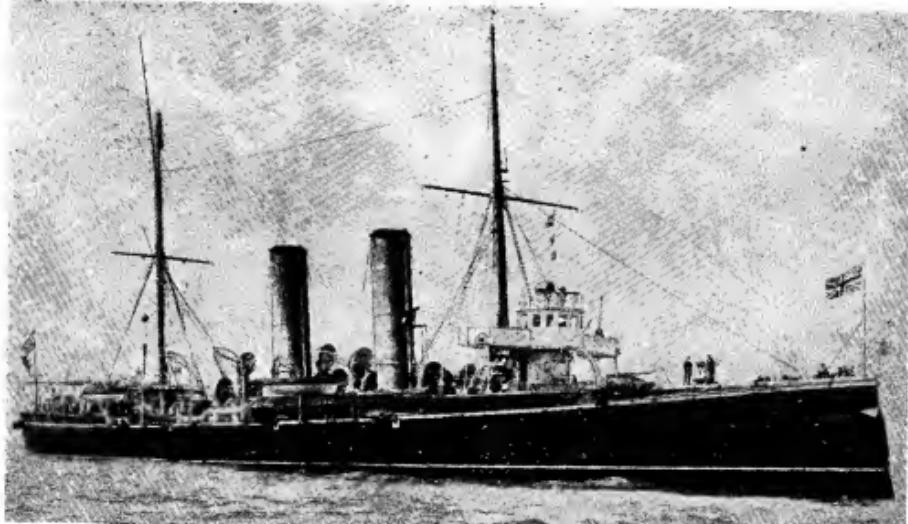


Photo No. 2. The alleged prototype! H.M. Cruiser "Rainbow," 3,600 tons, 9,680 i.h.p., a wood sheathed vessel, built by Palmer's in 1891

(k) Boats of model are larger in proportion than those of prototype.

(l) Mainmast of *Rainbow* is forward of aft pair of ventilators, and carries a platform which is also supported by, and forms the roof of, a house on the quarter-deck. There also appears to be a house right aft, and certainly there are some smaller ventilators there. The model has none of these features.

(m) Finally, and perhaps most telling of all, the foredeck of *Rainbow* is 20 to 24 ft. above the waterline (cf. height of man), whereas that of the model is not much more than twelve (scale) feet (cf. heights of companion-ways and of doors in ventilator-trunks).

Actually, the photograph of *Rainbow* is rather faded, and I'm afraid that in reproduction much of the detail will disappear, but I can assure the reader that I have examined it carefully with a magnifying glass and that the particulars I have given are really there. I can also say for certain that on the model there are no signs that it had ever had such features as the funnel-platform, etc., and moreover, that the model had been built to such fine detail that the signs would assuredly have been there even if the features themselves had been wrecked.

Sherlock Holmes Forward

What can we deduce from all the above, then? I should say, first and quite definitely, that this was *not* built as a model of *Rainbow*. Secondly, on the evidence of (c), and *every other* item after

tion were built in 1891, without the "gingerbread," whereas *Undaunted*, built by the same firm in 1888, had the scroll-work. It seems likely, therefore, that the prototype of the model was built prior to 1890. You follow me, Watson? Pray pass me my violin.

The question now at issue is: which vessel was the prototype? And that is where I hope some reader will be able to assist! I am *not* a naval expert, and I may say that the problem has baffled two of the leading naval experts of Britain—both men whose knowledge of naval vessels is encyclopaedic.

Vessels which the Model does not Represent

All I can do is give a list of the cruisers built by Palmer's, and to say that they do not resemble the model, judging by the photographs in the catalogue. They are as follow:—

	Date	Name	Displacement—tons	I.H.P.
1.	1885	Surprise	1,650	3,000
2.	1885	Alacrity	1,650	3,000
3.	1888	Orlando	5,000	8,500
4.	1888	Undaunted	5,000	8,500
5.	1891	Pique	3,600	9,680
6.	1891	Rainbow	3,600	9,680
7.	1891	Retribution	3,600	9,680

I have not included vessels after that date, as they are of no interest to our present purpose.

And of the seven ships named, the only one whose photograph is not in the catalogue is *Retribution*; but she is obviously a sister ship of *Rainbow* and thus is too big!

Which leaves us exactly where we were, wondering just what ship she is! So if any

were most beautifully fashioned. Guns were very well detailed, with operating hand-wheels, racks and worms. The two main guns rotated on four rollers on a circular track, as may be seen in photograph No. 3, where the gun-shield has been removed.

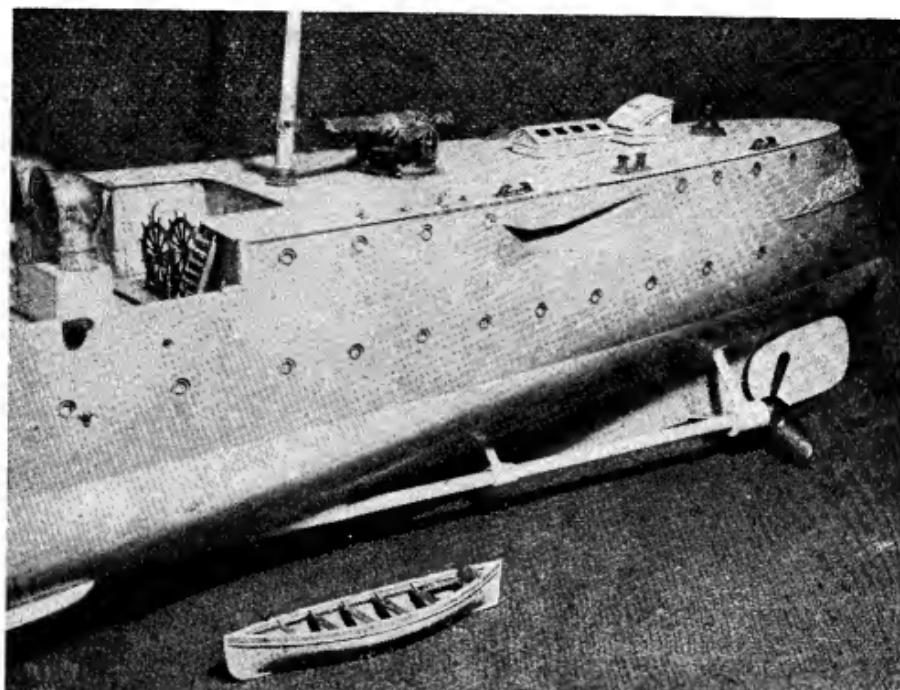


Photo No. 3. The after part of the model, with gun-shield removed. The guns were missing from both hull-barbettes on this side. Note spider band at foot of mast. Brackets on hull abreast of vents, are for one of the davits

reader has any clue or any suggestion, I should be very pleased to hear from him.

I have now found a good home for the cruiser with an enthusiast who is, to some extent, refitting her: but this gentleman lives some miles away, and, at the time of writing, I am unable to ascertain her exact measurements. She is approximately 6 ft. long, with a beam of 9 in.

To judge by the height of the doors, the guard-rail stanchions, and other features, she was built to 4-in. scale, which would give her prototype a length of 280 to 300 ft. The hull was solid, carved from one block, apparently, but probably with the raised parts fore and aft added separately. Her stern was rounded above, but tapered down until at or slightly above the waterline it came to a sharp edge similar to the bows—in other words, the L.W.L. was sharp at both ends.

The funnels were circular in section, having been turned from wood. The tops were hollowed out and painted dull black inside, giving the effect of metal funnels. The ventilators, davits and anchors appeared to be die-castings and

Step-ladders were of metal, apparently jigsoldered, and the two steering-wheels had turned spokes less than 1/32 in. in diameter. (Photograph No. 3.) The stanchions were of the three-ball type, with balls perhaps 3/64 in. in diameter, and the guard-rails were of extremely fine chain, but in the general damage to the model very few stanchions were left intact. Masts were broken off short, and the rigging was hopelessly snarled up, but it had been of properly woven cords of various thicknesses, and correctly spliced where necessary. This also applied to the funnel stays, many of which were broken.

Scroll-work at bows and stern was carved in sycamore, the central device of each being the Cross of St. George. Decks, skylights and companions were also of sycamore, and the trunks carrying the ventilators and funnels were veneered with the same wood, about $\frac{1}{8}$ in. thick, carefully mitred at edges and corners so that no end grain was visible at all. All panelings, mouldings, doors, etc., were set out on the sycamore.

(Continued on page 661)

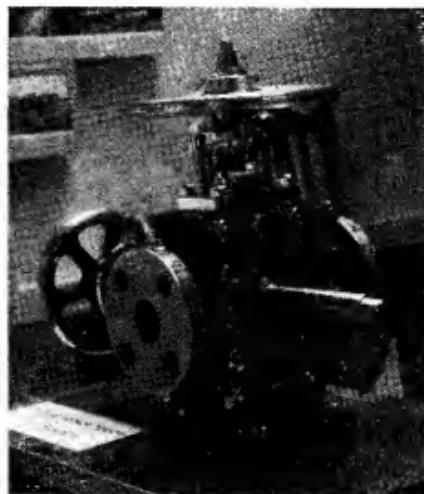
Model Display at Newbury

THE Newbury Model Engineering Society recently held a very successful exhibition of models in connection with the local civic week exhibition, in the Corn Exchange, Newbury, Berks. A large dais at one end of the hall was allocated to the display of the models, which were widely varied and well laid out. They included several examples of model locomotives and components, including an unfinished 3½-in. gauge 4-6-2 Pacific by Mr. Thurley, and a 7½-in. gauge 4-6-0 by Mr. Terry; the latter also ran a locomotive of the same gauge on a passenger-hauling track at the back of the hall. In the marine section, a very fine power plant, including a triple-expansion engine, with boiler and auxiliary plant, was shown by Mr. Simmonds.

Wing-Commander Lewis displayed a Vosper type Air-Sea Rescue launch, and an unfinished hull for a Bristol launch, also a racing yacht. Examples of small compression-ignition engines and metal dies for casting their components were shown by Mr. Bashford. Among tools and workshop appliances, Mr. Thurley's drilling machine, constructed mainly of light alloy castings, was of special interest.

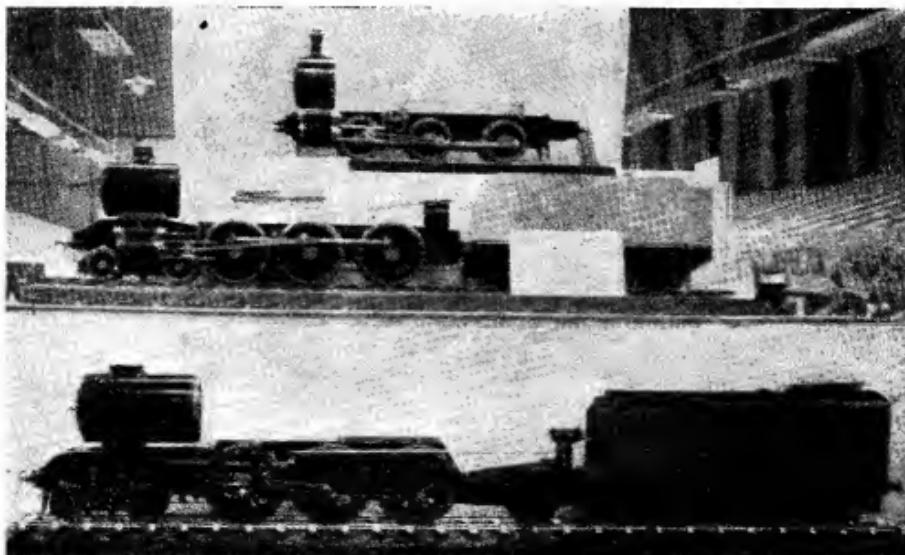
The arts and crafts section included some examples of wood turning by Mr. Allinson, a pair of delicately carved candlesticks, produced entirely by hand methods, by Mr. Maisey, and a novel example of sheet copper work, consisting of a vase with realistic roses, by Mr. Hackwill.

Other items of engineering interest in the main

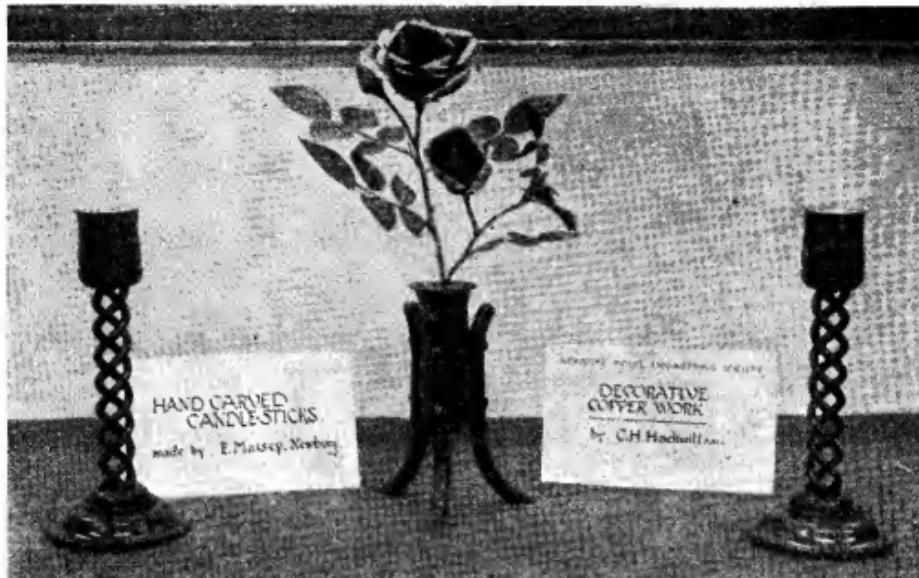


A sectional working model of a new type of rotary pump by Messrs. Plenty Ltd.

hall included exhibits by Messrs. Plenty, a local firm which has long held a well-deserved reputation for marine steam and diesel engines, pumping machinery and similar products. An item of special interest on this stand was a sectional model of a new type of variable-output rotary pump which combines ingenuity and mechanical simplicity with high efficiency. Models of cargo



Some of the locomotive exhibits by members of the Newbury Model Engineering Society



Examples of decorative copper-work and woodwork

ships powered by engines built at the Newbury works of Messrs. Plenty were also shown.

Messrs. Vickers-Armstrong, whose local works is devoted mainly to the production of aircraft accessories and furnishings, displayed some very interesting examples of these products, as well as several models, including a large mechanical model of a new type of flying boat, in which the angle of incidence of the main planes can be controlled, with the particular object of facilitating

landing at low speed, and the planes also fold back over the body to reduce stowage space.

Examples of precision gearing and component work were shown by Messrs. Opperman Gears Ltd. Models and photographs of the engineering plant and equipment of the local municipal sanitation, and the application of the latest equipment such as visual aids in education, all combined to produce a most interesting and well-staged exhibition.

Mystery Cruiser!

(Continued from page 659)

more in Indian ink and nearly all the doors were depicted partly open. The gratings at the steering position and in the boats were most beautifully made from strips of sycamore or boxwood about 1/32 in. wide.

Of the boats, only three remained, and one of these is shown in photograph No. 3. The workmanship was exquisite: the hull had been carved from the solid, including the half-round rubbing strake, while bottom boards, seats, and other fittings were in mahogany.

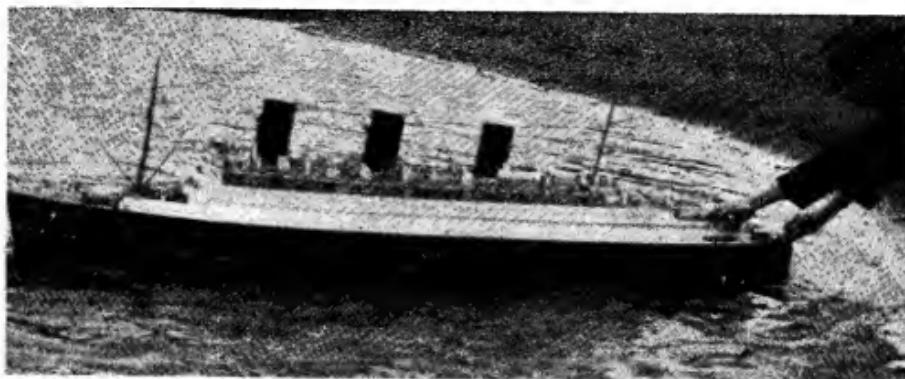
The hull was painted smoke grey, with buff boot topping. Ventilators were silver-plated, but painted pink inside. Other metal fittings were silver-plated, too, but some were oxidised, including bollards, fairleads, capstans, steering-wheels, and propellers. Funnels were buff.

The photographs show the boat as she appeared at the 1948 exhibition of the Sheffield S.M.E.E., where she created quite an interest. For the occasion she had been cleaned up, the snarl of rigging, broken stanchions, and guardrails having been removed, and the hull and upperworks cleaned with warm soapy water and a soft cloth, plus a spot of "Vim" in some of the most obstinate places.

From the foregoing description I think it will be fairly obvious that the model was professionally built.

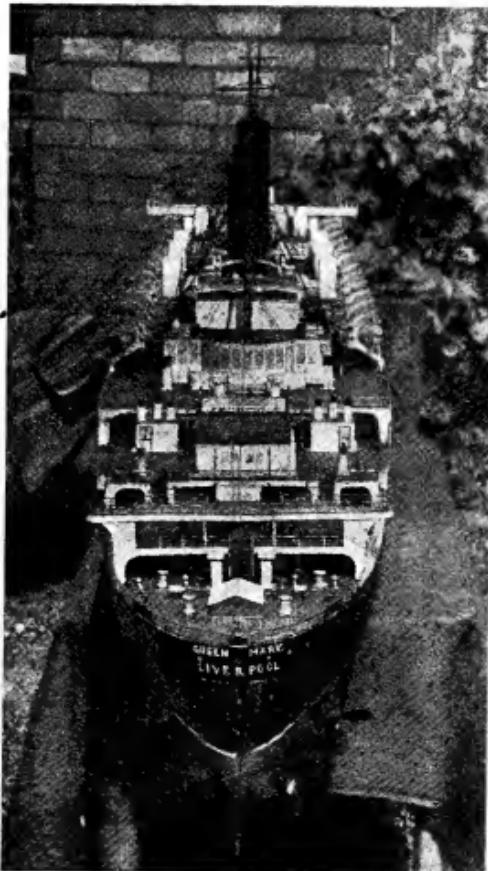
It seems reasonable to assume, therefore, that she was of an actual prototype, since no hard-headed shipbuilding firm would throw money away in building a model of some nonexistent ship. All we want to know is—which ship was the prototype?

A Working Model "Queen Mary"



WE have received some photographs and details of an interesting electrically-driven working model of R.M.S. *Queen Mary*, built by Mr. A. S. Mundy, of Port Talbot, Glamorgan, during the war years.

The model is 7 ft. 7 in. long by 12 in. beam, and measures 21 $\frac{1}{2}$ in. from the keel to the top of the funnels. The metal hull was built upside down on a building board which was bent to the sheer of the ship. It has a girder keel and fifty pairs of ribs made of $\frac{1}{16}$ in. wire, and a dozen stringers. At every point where the stringers cross the ribs, a square piece of tin was soldered on to strengthen the joint. The plating is put on in strakes as in the actual ship, and up to the main deck ladder there are over four hundred plates in the hull. The decks are of three-ply and the



deck planks are marked. From the view showing the stern, it will be seen that the details of the superstructure have been faithfully reproduced, and that railings and companion ways have been fitted at all the appropriate places. Even the ladders on the funnels up to the sirens have been included, although they are only about $\frac{1}{4}$ in. in width.

There are four propellers, each driven by a separate motor, each of which can be switched on separately, the switches being located under the docking-bridge at the stern. Mr. Mundy has made a number of experiments with the propellers, and those now fitted are the third set he has made.

In concluding his notes, Mr. Mundy writes: "I have been a reader of THE MODEL ENGINEER for more than thirty years, and have been inspired by it many times."

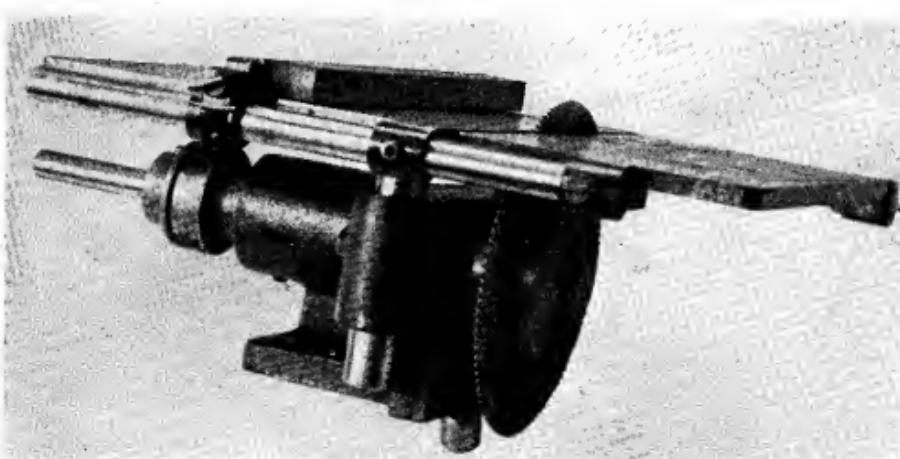
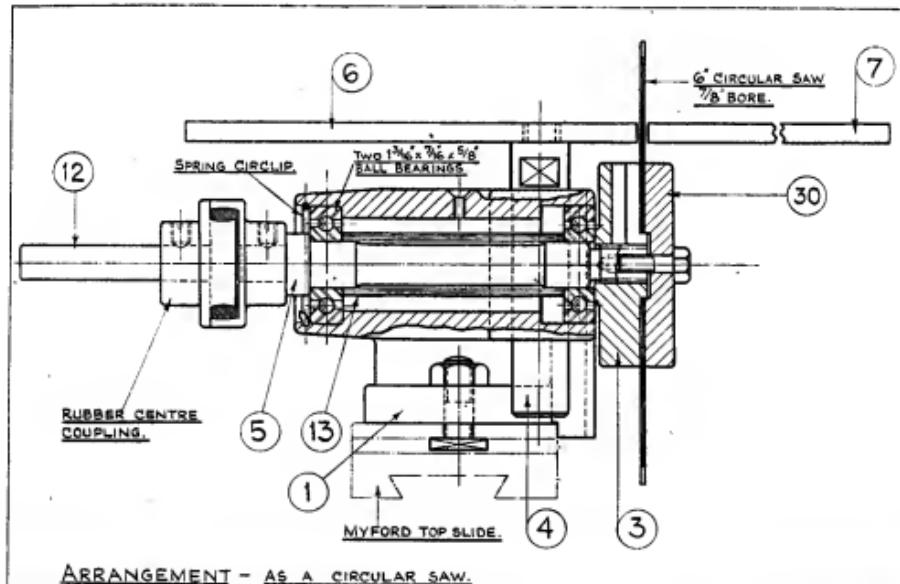
A Combined Circular Saw and Fretsawing Attachment

by G. H. Walter

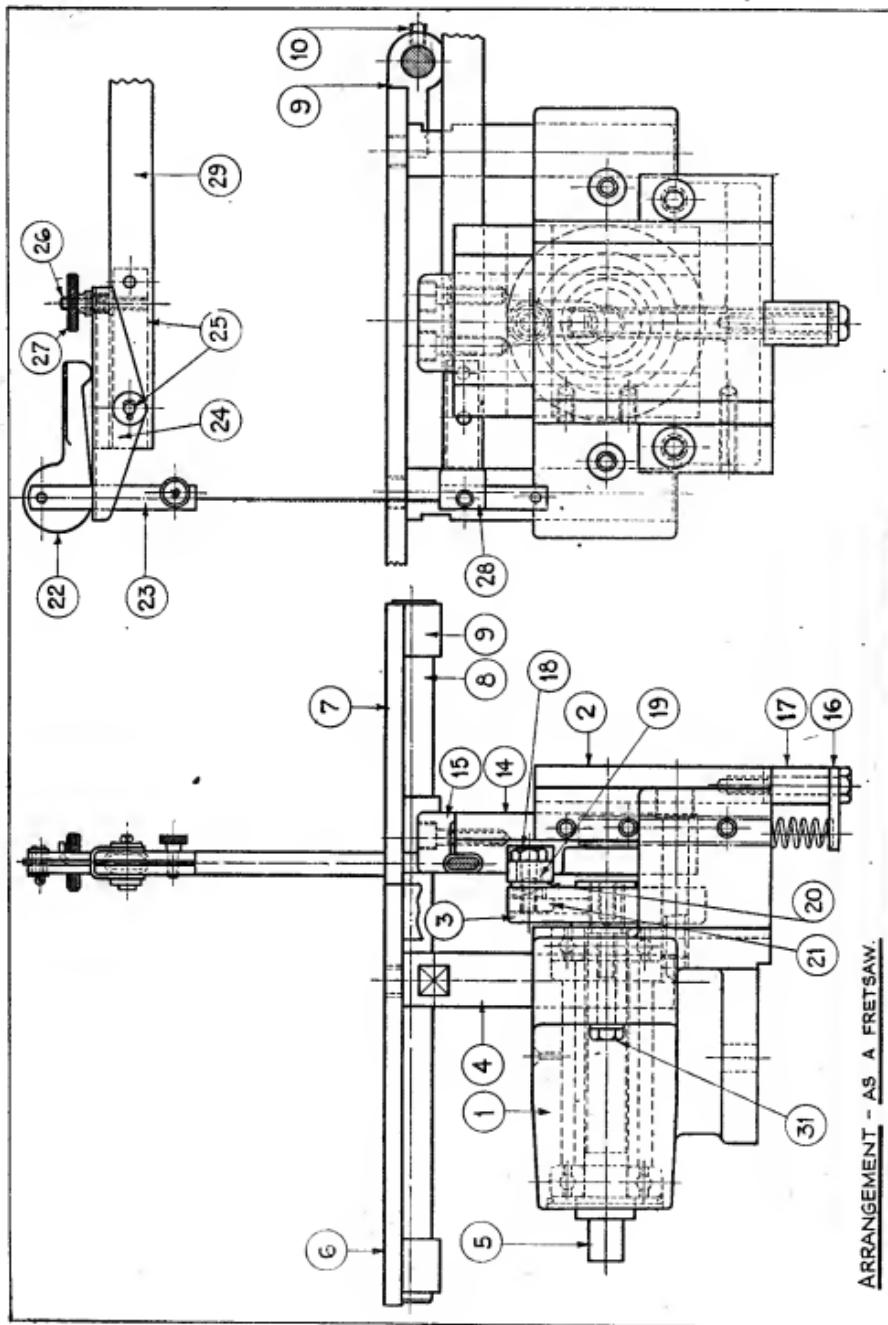
A FEW months ago, I was faced with the difficult question of what to make as my next model—difficult, because there are so many things I have longed to make for years, and so little time in which to make them. Visits to South Kensington Science Museum only in-

creased the number of possibilities, and made the decision harder. At length I decided to make the lathe attachment which I am describing, so that when I do come to a decision I can quickly make any patterns I require.

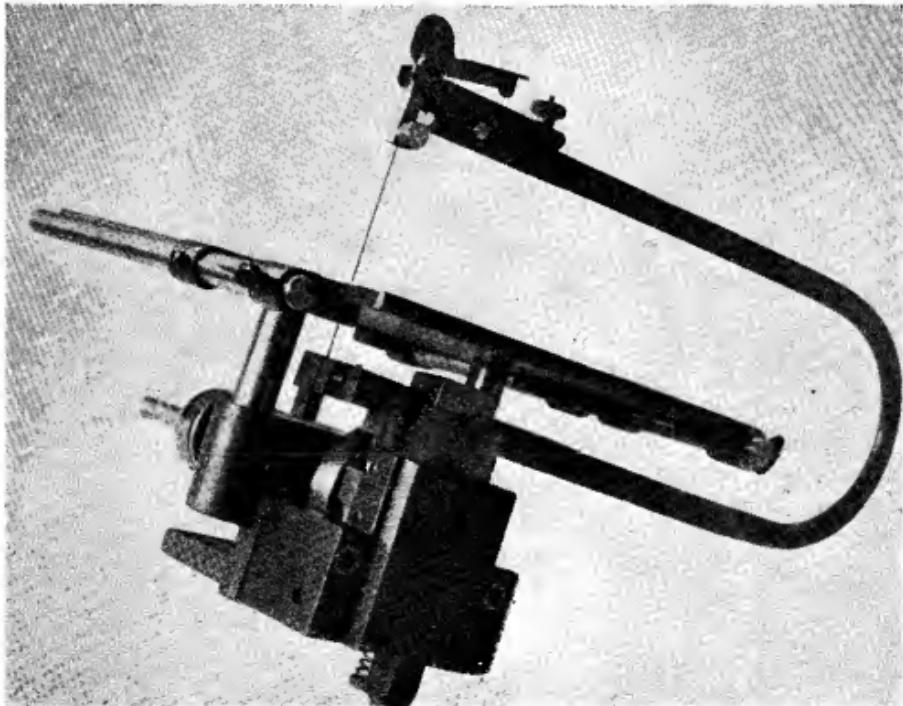
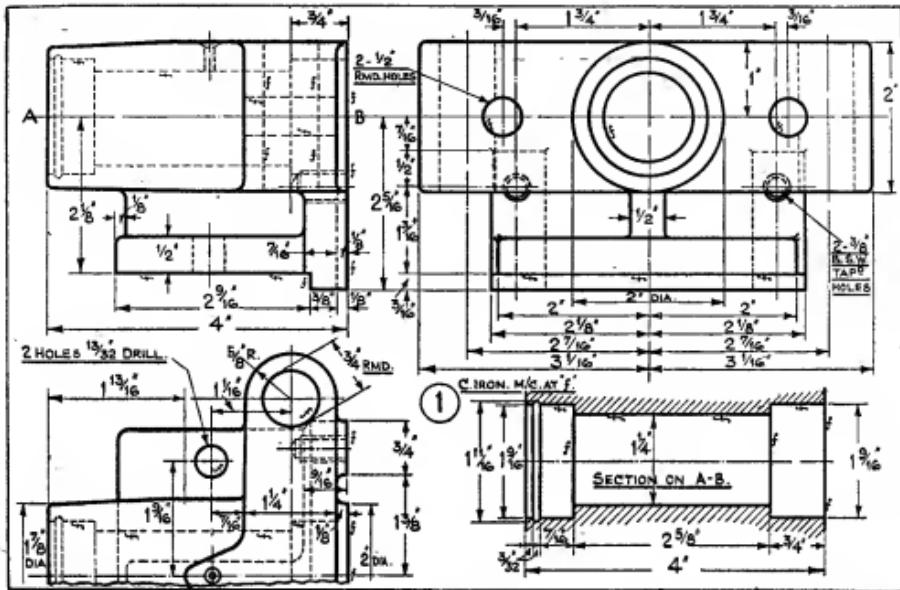
The private model engineer, with his "one off"



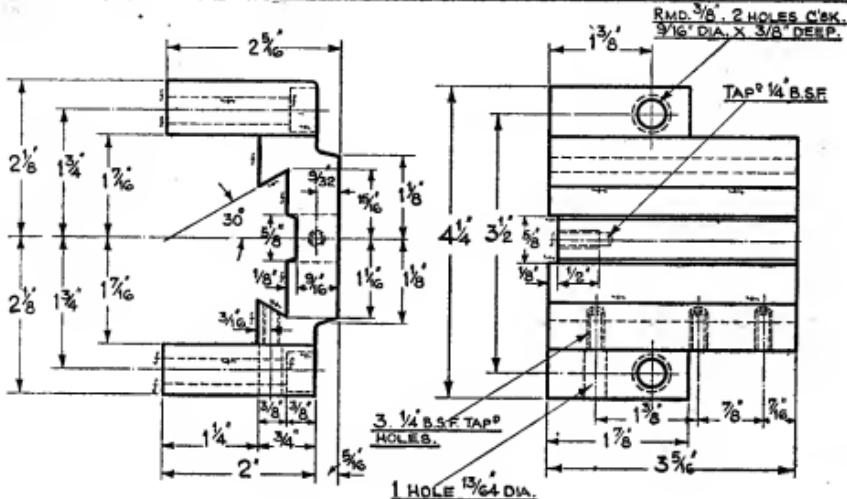
Assembled circular saw attachment, complete with fence



ARRANGEMENT - AS A FRETSAW.



Assembled fretsawing attachment, with fence removed



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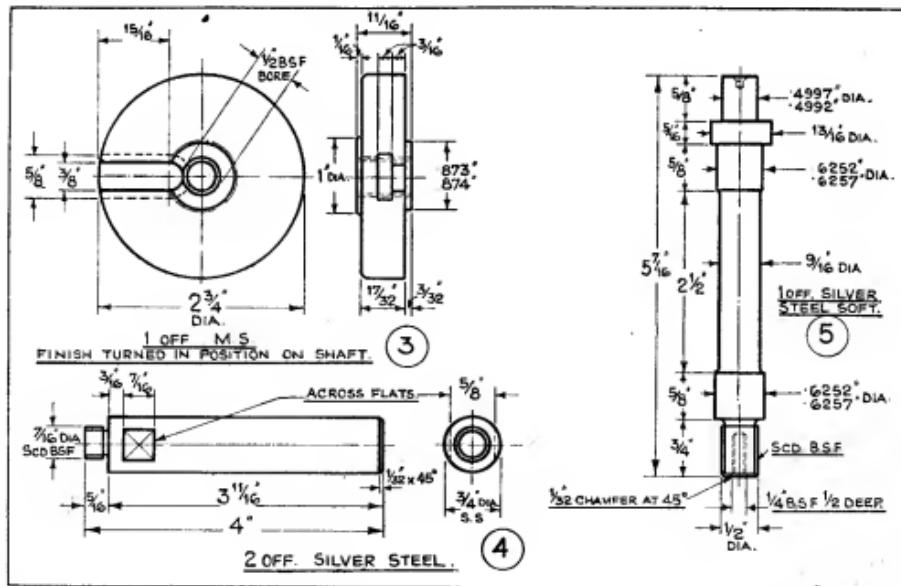
MACHINE AT 5

jobs may spend many hours over one component of a model, in contrast to the professional, with his greater equipment and special jigs and tools, who could make a similar part in half the time, and with greater accuracy.

In my own case, therefore, I am endeavouring to build up a stock of special-purpose tools, which shall have the possibility of repeated use

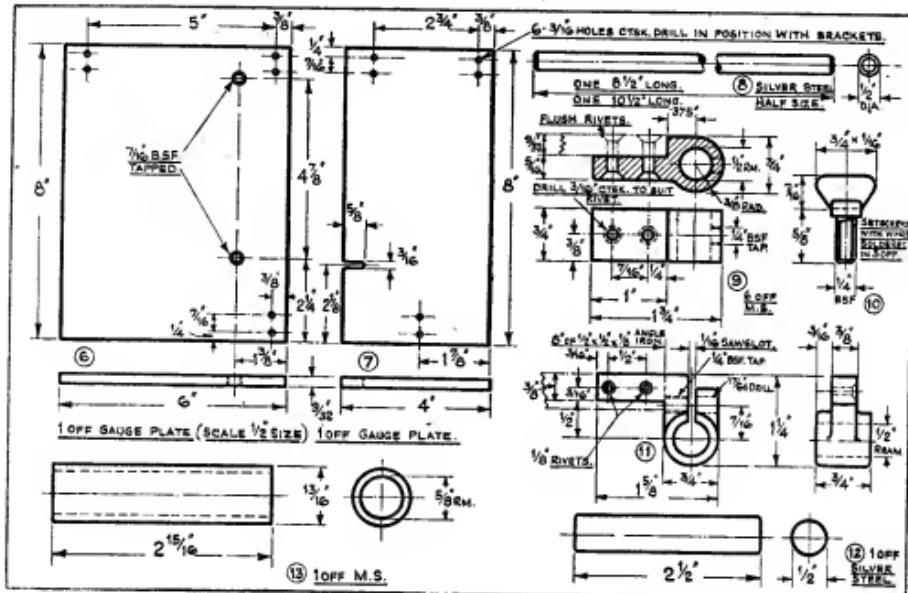
and all have as their ultimate object the making of models of better finish and accuracy, and in less time.

I am aware, of course, that as a hobby the time factor should not be over-stressed, but I believe that throughout the country there are many partly-finished models that have been abandoned because the interest has flagged owing to unduly



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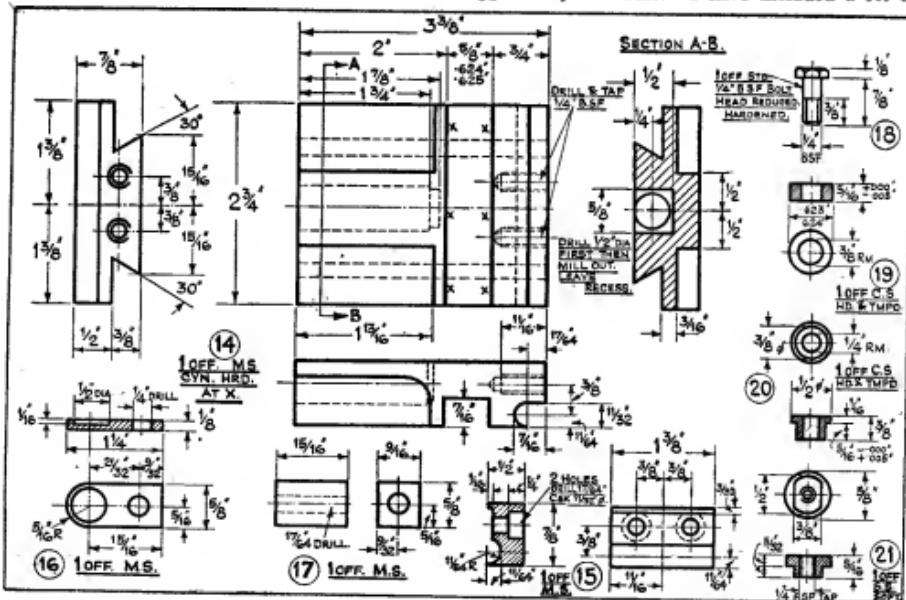
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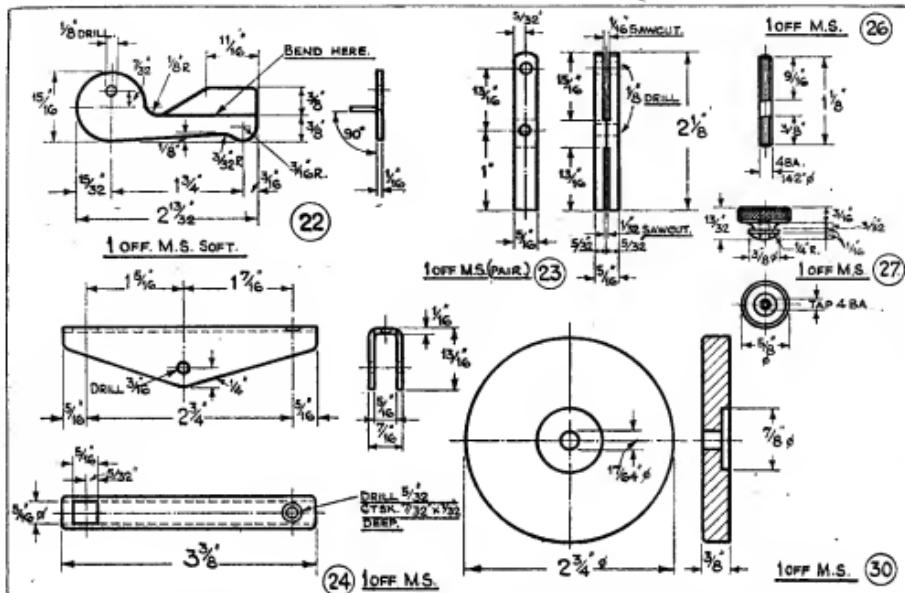


prolonged construction. If a model can be made reasonably quickly and yet well, enthusiasm will not die. Many well-known model engineers are *jig-minded*, as can be seen from the pages of THE MODEL ENGINEER from time to time, a particular instance being the "Silver Rocket" by Dr. Bradbury Winter, where even for rivet spacing he made a *jig*.

I am not an admirer of the craftsman who proudly tells you that he took a month over one component. This fixture, therefore, comes into the category of useful tools, apart altogether from the pleasure of designing and machining it.

The attachment is a combined circular saw and fretsaw, to be driven by my recently acquired $\frac{1}{2}$ -in. Myford lathe. I have included a set of



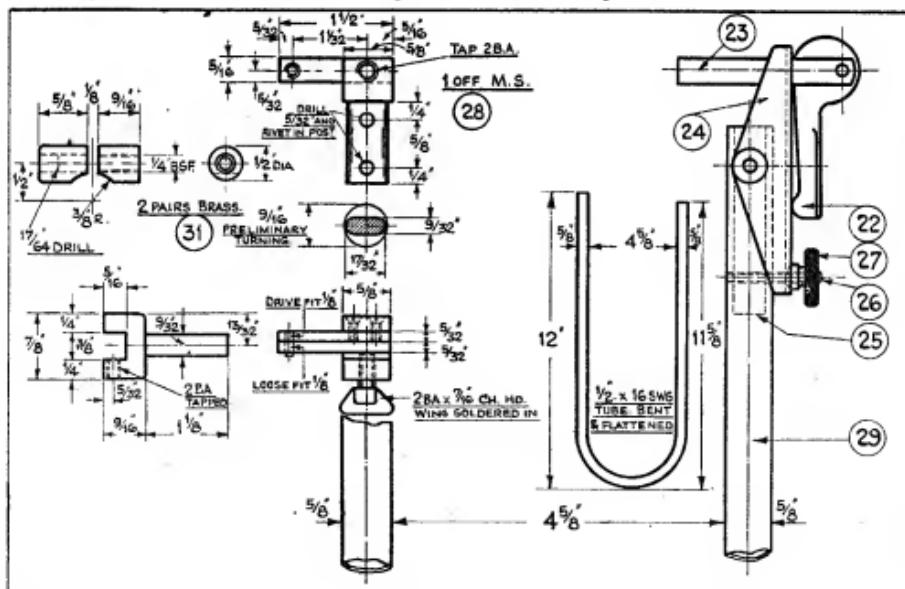


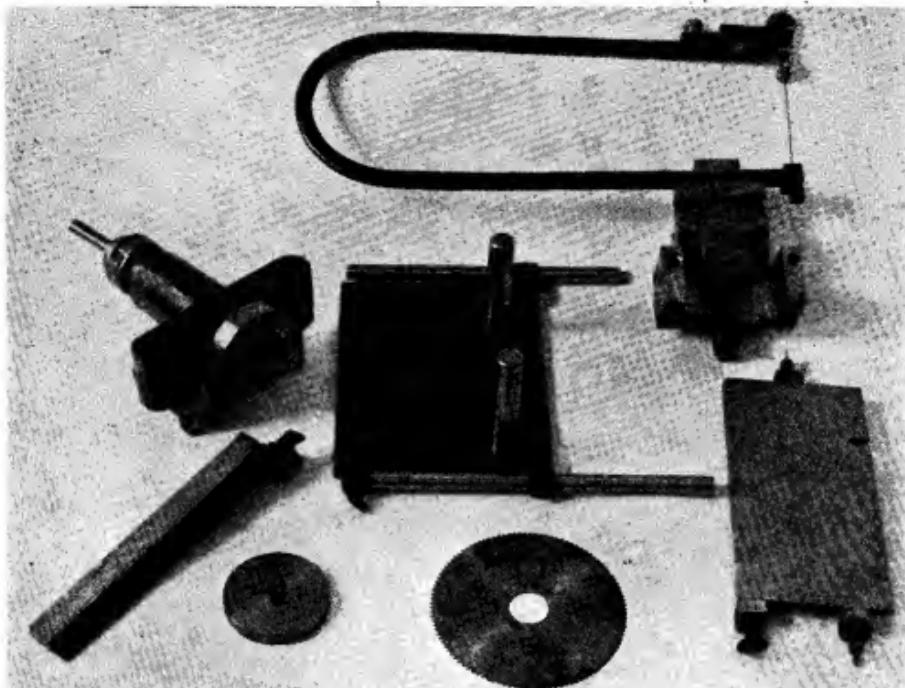
drawings, so that any reader who cares to, can make a similar attachment. All the machining was effected on the lathe itself, and I think that the detailed drawings, in conjunction with the arrangement drawing, will be self-explanatory.

When in use, the lathe top-slide is removed, and the main casting of the attachment, with its holding-down tee-bolts, is slid on in its place,

up against the projecting ledge on the casting (which ensures the shaft being parallel with the lathe bed) and is then bolted down.

When the circular saw is to be used, it is placed on the main spindle register, together with the clamping disc, and is screw-tightened. The table of the attachment is then lowered, so that the saw is exposed to suit the wood thickness.





The fretsaw unit complete, with driving unit, main table, subsidiary table, fence, circular saw and clamping disc.

When cutting grooves or rebates, the groove depth is left exposed. The outer portion of the table is then slid on to the guide bars, leaving sufficient gap for the saw to run freely, and is pinched by the three thumb-screws. After winding over the cross-slide until the main shaft lines up with the headstock spindle, the driving shaft is gripped in the chuck, any slight malalignment being compensated by the rubber coupling. If the casting is bored in position, between centres with a boring-bar, the centre height will be automatically correct, and it is only necessary to secure correct vertical alignment. If, at the outset, the cross-slide and saddle are marked with coincident lines, it is quite a simple matter to set up at any time. It is now ready for cutting, any adjustment in table height up or down being effected by loosening and then tightening the pad-bolts. Despite the length of this description, the actual change can be made in two or three minutes.

For diagonal cuts, I use flat pieces of wood of about 4 in. \times $\frac{1}{2}$ in. thick, cut at the required angle with a bead of $\frac{1}{2}$ in. \times $\frac{1}{2}$ in. wood screwed to the underneath edge at the right. This is then pushed across the table with the job held against it, through the saw. For bevel cuts, a similar arrangement can be made of 4-in. \times $\frac{1}{2}$ in. thick wood,

tilted to the required level by screwing a strip of wood to the underside, which shall hold it at the angle and at the same time guide on the right-hand edge of the subsidiary table. I may make, at some time in the future, a combined bevel and diagonal cut fence—if the need arises.

When the fretsaw attachment is needed, the outer table portion should be removed, together with the saw, clamping disc, and screw. The crankpin is then slid into the tee-slot of the main spindle, and is adjusted to give whatever stroke is required (within its range of 1 in. to $2\frac{1}{2}$ in.) and its locking-screw tightened. The fretsaw unit is then placed against the casting, with its driving groove over the crankpin, and is bolted on with the two $\frac{1}{2}$ -in. Allen screws. The outer table portion is slid on the two guide-bars, hard up against the main table and is pinched with the three thumb-screws. The fretsaw blade will come within the slot provided in the outer table and, after adjusting table height, fretsawing can begin. For thick or hard woods, advantage can be taken of the three-grooved headstock pulley to slow down the speed, if the saw gets too hot.

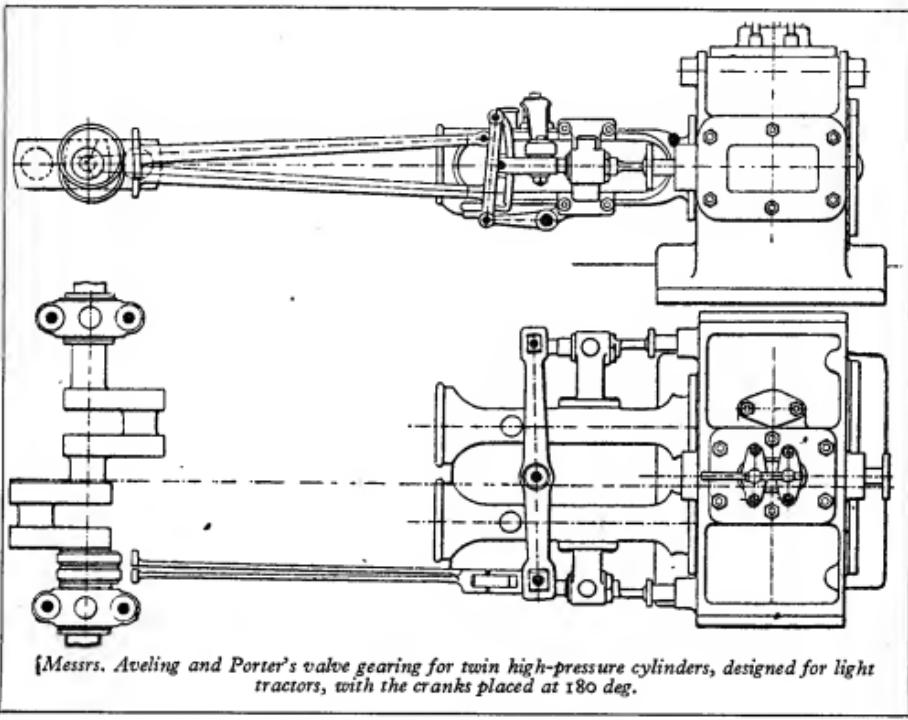
I shall be pleased to augment any machining information required, or to loan the patterns to any reader desiring to make up this attachment, if he will write to me, through the Editor.

Neville's Valve-Gear for Traction Engines

by E. A. Steel

ABOUT 18 months ago, I had occasion to make a search through the extensive records of the late Henry Greenly to see if I could find any further reference to Neville's valve-gear as applied to traction engines during the early part of this century. A series of articles

form of cuttings from *The Engineer* for December 7th, 1906, describing this same "light steam tractor." It is interesting to note that the tractor was designed to work under the Motor Car Act of 1904. The engine could work on two speeds and was fitted with injector and pump, com-



Messrs. Aveling and Porter's valve gearing for twin high-pressure cylinders, designed for light tractors, with the cranks placed at 180 deg.

from the pen of Henry Greenly appeared in this journal about 15 years ago, and it was in one of these that he described the gear as fitted to a light tractor built by Messrs. Aveling and Porter Ltd., of Rochester in 1906. (See *THE MODEL ENGINEER*, December 29th, 1932.) The tractor was driven by a two-cylinder compound steam engine fitted with a single set of Stephenson link-motion connected direct to the high-pressure cylinder only. The low-pressure cylinder was operated by a lever connected to this link motion. As the travel of the valve for the low-pressure cylinder was longer than that of the high-pressure cylinder, the lever had to be pivoted unequally; the ratio being approximately 1.3 to 1.

It was not until recently, however, that I made further discoveries while searching for other data among these same records. These took the

pensating gear and screw friction-brakes for the rear pair of wheels. An additional water-tank was suspended under the boiler barrel and in front of the firebox. The weight of the engine in full working order was 6 tons 7 cwt. On a test "run," the tractor covered a distance of 19 miles in 5 hours, an average speed of 3.8 m.p.h. The amount of fuel (coal) consumed during the test was 3 cwt. and the load hauled in trucks behind the engine was 12 tons 14 cwt., making a total load of 19 tons 1 cwt.

The above brief notes are submitted for the benefit of those "ardent traction engine fans"—to quote Mr. T. Ison in his letter to *THE MODEL ENGINEER* for October 21st, 1948—who are seeking any information concerning steam-driven traction engines of the past 150 years.

A Christmas Lobby Chat

by "L.B.S.C."

BY the time you read these words it will be Christmastide, so let us give the construction notes a week off, adjourn to "ye olde lobbye," and have a friendly chinwag around the old stove. Pass the tea-bottle, Montmorency—I expect the gentleman with the cultured voice who reads out the weather report, news, and

quarters; it was trotted out again in a recent radio programme.

There are, it is said, exceptions to every rule; and this particular ginger-haired and freckled young fellow was an outstanding exception to the joke referred to above, despite his 'Oxton accent.



Photo by]

A couple of "real smashers!"

[Fred Stone

further outlooks, missing phenol-barbitone tablets, and so on, would pronounce that "Muntmurency." Personally I prefer the 'Oxton accent to the Oxford ditto! One of the announcers, the other evening, referred to the district south of Catford, as "Brumley," a pronunciation I never heard locally, all the years I have known the locality, and that is a good many. I wonder what the worthy inhabitants of Bromley-by-Bow would say to a similar rendering? Speaking of announcers and Bromley, always recalls to mind a porter at the Elephant and Castle station of the old London, Chatham and Dover Railway somewhere around 1888. The average porter's rendering of a string of station names has long been a music-hall joke, and still is, in other

A Living "Loud-Speaker"

I can recall, as if it were only yesterday, that I had been on one of my "wandering" tours to look at the shops all set out for Christmas; and after going around the City, had crossed Blackfriars Bridge, and headed south. Scorning the horse- and mule-power tramway cars, I decided to go to the Elephant and Castle station, and proceed by train to Peckham Rye, from whence it was an easy walk home. I purchased my three-halfpenny half-ticket, and at the top of the platform steps, was informed by the above mentioned individual, with a cheery grin, that I had just missed one train, and the next one calling at Peckham Rye would be the Crystal Palace local, in about half-an-hour—"you'll hear me call

out, young 'un"—he certainly said it! Naturally, I didn't mind waiting on a busy railway station. Two or three fast trains went through, one of them hauled by an old 2-4-0 with outside cranks. The coupling-rods dancing up and down, clear of any wheels, always fascinated young Curly. Then a bogie tank engine, running bunker first with a ten-coach suburban set, hove in sight around the curve, and a clear ringing voice echoed through the station, announcing (phonetic pronunciation as well as I can recall it)

"Ermill - dullidge - sinnamill - pench - kentouse - becknam - shortians - bromley-'n-bickle train!" Even anybody on the platform who was unacquainted with the L.C. & D.R. suburban line between Herne Hill and Bickley, couldn't have misunderstood our friend in the green corduroys. I just had time for a quick "eyeful" of the engine before she pulled out again; though all black, she was lovely and clean, with the columns of the Ramsbottom safety valves nicely polished, and on the bunker was a plate which read "Sharp, Stewart and Co. Ltd., Atlas Works, Glasgow."

A Puzzle

One thing puzzled me; the condensing pipes ran from the smokebox halfway along the tank top before they turned down and entered it. Why couldn't they go in the front end of the tank, same as on my dearly-loved engines of the L.B. & S.C.R.? Whilst turning this point over in my mind, as children will, the Crystal Palace local came in, and I could hardly believe my eyes; on this engine, the condensing pipes *did* go in the front end of the tanks! I gave it up as a bad job, and scrambled out quickly at Peckham Rye for a hurried look at the engine. She was slightly smaller than the Sharp Stewart one, and I just managed to spot the builder's plate (Kitson & Co.) before she pulled out. I noted, with some jealousy, that she got away just as quickly as the Brighton engines *did*; but consoled myself with the thought that maybe the driver had learned a thing or two from the Brighton drivers, as the lines ran parallel between Cambria Junction and Peckham Rye, as well as from Wandsworth Road to Brixton. Children get hold of some quaint notions, don't they?

"Jeanie Deans" at Work

Speaking about black engines, here is a picture of the little black lassie I have often mentioned in these notes, in company with another lassie who isn't quite the same colour! I have mentioned also, that "Jeanie" is an interesting engine to drive, and inclined to be a bit tricky with anyone who doesn't understand her; but the embryo film star at the throttle understands her all right—a kind of sisterly sympathy, shall we say? Some of the good folk who have purchased supplies from Dick Simmonds's shop at Erith, won't need any introduction to his eldest daughter. Sometimes you see a picture of a film star, or a famous actress, kicking off at a football match, or opening a bazaar, or some other function, just for the sake of publicity; but there is nothing like that about Doris. She drives engines because she likes driving them, and has spent hours and hours "on the footplate"; not only understands

all their internal anatomy, but can make adjustments and repairs, so if she and Mrs. Austen-Walton got talking together over an afternoon cup of tea, the conversation *might* not be confined entirely to femininities! Doris "got the hang" of handling the compound after a very few laps, and had stopped for a drop of water in the tender when Fred Stone took the shot. Note the safety-valves! She finished the run with a load of passengers.

My Youngest Driver

The boy in the picture is the youngest of the Simmonds family. He is quite at home with his father's "Dairymaid" 4-4-0, or Fred Stone's "Maisie"; and is, so far, the youngest driver that has operated over my own road. They always make fun of the poor kid, because his fingers are naturally tender, and every time he touches a "hot spot" he pops them in his mouth in double-quick time! However, he can take a load of girl friends of contemporary age around the Falconwood Light Railway without running off the road or "dropping the lead plug," although he is rather more inclined to favour boats and motor vehicles, than locomotives. Incidentally, Fred Stone's artificial leg used to puzzle him. Fred was at one time a locomotive fireman, and one sad day the engine ran over his foot. After a spell in hospital, he was provided with an artificial leg and foot, which is of natural shape; and he wears both boots, both socks, and trousers in the ordinary way, so that normally, the injury is not noticeable. When John Simmonds was a very small boy, Fred would pretend that his sock kept slipping down, and would proceed to knock a tack in the artificial leg, to keep it up. How on earth Fred could knock a tack in his leg without feeling any pain at all, puzzled the boy no end, as he couldn't do it himself!

By the Wayside

Fred's artificial foot was the cause of an accident on my road, which might have had serious consequences. He was driving his engine "Maisie" around at a good clip, and just after passing the viaduct, he went to attend to the fire. At the point where the line comes out of the curve and enters the long straight, it runs very close to an iron fence, and abuts on to the concrete path; and the ground being banked up at this point, the line is several feet above the level of the path, a concrete retaining wall keeping the earth in place. Fred's foot shifted under him without his being aware of it, and as the engine swung into the straight, the foot caught up in one of the concrete posts and derailed the whole engine. Fred went over backwards on to the concrete path, and the locomotive and car dropped on to the soft ground, the only damage to it being a bent cabside and roof; but we thought Fred had sustained a serious injury. However, he was only a bit dazed, and after a short rest, continued running.

I nearly "caught a packet" on one occasion, which also might have been worse than it was, had it happened in another place. I had fixed an oil-burner for a friend, and was trying the engine. This was an ex-commercial job, and had

a centre-sprung bogie attached by a long set-screw to the underside of the cylinder casting ; no bogie pin at all. I was going around at a "scale ninety" when the confounded set-screw came loose, dropped down, and caught the sleepers. The engine turned a complete somersault, broke away from the tender, and fell in the earth, whilst the car on which I was riding "telescoped" on the tender, jumped the road, and shot me clean over the side. As luck would have it, the pitch-in occurred on the east side of my line, where the earth is at rail level on the outside of the oval, on account of the slope of the ground, so I didn't have far to fall, and the only damage was a tear in my overall coat, which caught the ends of the sleepers as I went over. The engine sustained no damage whatever, except for the broken coupling ; but it is hardly necessary to add that I fitted a proper bolster and pin in the correct position before returning it subsequently to its owner !

Emulating Old "Bonchurch"

One Sunday afternoon during the war period, my old friend of the L.B. & S.C.R., Mr. W. Briggs of firehole-ring fame, was in town on business for his firm, and called to see me, in company with Mr. O. J. Morris, the well-known locomotive photographer and writer. He had built a little 0-4-0 on $2\frac{1}{2}$ -in. gauge, an experimental job, and wanted to try it on my road. Jerry had left us in peace that afternoon, so he duly got up steam and sent the engine off light. She rattled around at a good speed, but was wagging her tail rather badly, as 0-4-0's are prone to do. I said to "Bro. Firehole," "She will be emulating old 'Bonchurch' in a minute," and hardly were the words out of my mouth, when she did, turning completely over and landing upside down with the wheels spinning, just like old 297 "Bonchurch" did at Mayfield, back in September, 1897. Friend Briggs said, "She must have heard you." Like "Bonchurch," when she was put on the rails again, she was able to go away under her own steam.

Some folk like to see the little engines in action, but will not take a chance and drive

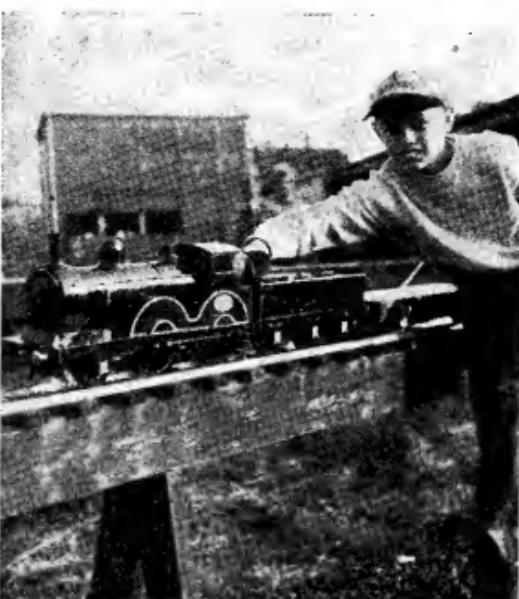
themselves. The late Cecil O. Purdey, of sporting gun fame, was one. He was a prolific builder of chassis, but not of boilers ; I made and fitted several simple water-tube oil-fired boilers, just so that he could see if his handiwork would do the doings all right. One so fitted was a 4-4-0 of light construction, and when on test, hauling my weight, one of the coupling-rod pins came out and disappeared in the grass, causing a sudden stop and bending the other side rod ; so I took the rods off altogether and continued the trip with the engine running as a single wheeler. There was only 6 lb. adhesive weight on the one pair of wheels, but she didn't slip, and took me around at a good lick. I mentioned this in the notes, and asked if any of the calculation fraternity could explain it. Soon after I received a very learned dissertation on the subject, the writer treating me as a sort of schoolchild who didn't know the fundamentals of

A.B.C. ; so, to get my own back, I thought I'd pull his leg, and wrote "Dear Mr. So-and-so, —I carefully studied your explanation, but think you are rather off the track. We got some marmalade and stuck it all around the wheel treads, which completely removed all tendency to slip. Faithfully yours, L.B.S.C." I don't believe he has forgiven me from that day to this !

A Hefty Driver

Our advertisement manager got a surprise on my road a short while ago. He is a hefty person, but old "Ayesha," now 27, treated him like a bag of feathers, starting without the ghost of a slip although it was our friend's first effort at engine-driving. After a while, I put another car in between him and the engine, sat on it myself, and let the old girl haul the pair of us, a load equal to 57 coaches, but still no slip ; and she scooted around at breath-taking speed with only half regulator. "Ancient Lights," the rebuilt single-wheeler now over 60 years of age, absolutely refused to slip either with Mr. Barltrop of Edmonton, or Mr. Morgan of Chichester, although she has brass wheels.

The only "foreign" drivers who run over my road now, are my few personal friends, with an



The exile—Mr. Nelson Burti's "Petrolea" at Sharon, Mass., U.S.A.

occasional special exception, such as the C.M.E. of British Railways. In days gone by, I used to entertain occasional visitors, but they *will* persist in taking curves at much too high a speed, getting off the road, and tearing off screw-heads, breaking washers, and cutting up the sleepers. After one trip by a visitor from Canada, I had to replace over a gross of screws and washers, and renew a number of split sleepers ; and life is too short for that sort of thing now ! They couldn't do it on the old line at Norbury, as that was a straight up-and-down outfit ; but we got a few amusing incidents there. An American friend who weighed about 16 stone took a ride behind my gauge 1 American 4-6-2, "the Lizzie," which was spirit-fired and had a water-tube boiler. When the engine started off, he let go the throttle, and clung on to the flat car with both hands, calling out as she gathered speed "Tisn't possible—can't believe it—tisn't possible !" The same party was the "victim" of a practical joke at the New York Exhibition of 1929, and the same engine was involved. She had been hauling two adults at a time (not bad for a gauge 1 "poison-gas" outfit) and a couple of American locomotive engineers (drivers) averred that she only maintained steam because of the pause at each end, giving her a chance to recover any loss of pressure. To convince them that such was not the case, I took her off, and put her on the circular road in the annexe, borrowed ten heavy American cars, and set her off with them. She ran 32 minutes without a stop on one boilerful of water, and the two "hoggars" gave me best ; but the comic interlude was provided by my friend mentioned above. The circular track was on a raised stand like a glorified table, and he climbed up and stood in the middle of it, to watch the train doing the laps. A fellow-member obtained a big paper bag, got under the table without being seen, inflated the bag, and hit it with his fist. BANG ! Our friend took one flying leap off the table and disappeared—he thought the boiler of the little engine had blown up !

A Scale-tipper

Mention of "heavyweights" reminds me of the genial party who used to accompany the late "Bro. Wholesale" on his visits to me ; his "delicate little friend," he called him. He was a proper scale-tipper, and I nicknamed him "Bro. Avoirdupois," much to his amusement. He was a lifelong friend and inseparable companion to our departed brother, and as the latter was in poor health, it was advisable for him to have somebody in the car with him on the trip of 76 miles each way, from Bursledon to my home and back. If the day happened to be fine, "Bro. Avoirdupois" would usually say "I'm going to have a sleep whilst you two boys talk about railway trains" ; and he would go up inside the railway line, spread a coat on the grass, use a car cushion for a pillow, and depart for the Land of Nod, where he often remained all the afternoon. On one occasion he was still asleep when tea was ready, so we went up and found him snoring loudly. "Bro. Wholesale" gave him a playful kick in the ribs, which awoke him with a start, and he wanted to know what was up.

"Bro. Wholesale" said he was kicking up such a shindy that we couldn't hear the trains going by ! Memories of those pleasant visits make me feel awfully sad ; and sometimes I wonder how it is, that the good folk are often taken from the earth, whilst the bad are left to cause trouble, strife, and misery. I guess the answer will only be found on the other side of the Great Divide.

Christmas Recollections

Correspondents often ask me how I spend Christmas. Well, for the last 24 years, most of the time has been spent in writing and drawing for these notes ; the day is usually quiet, and I can get on better when there is no distraction outside. One Christmas day during the war period, which happened to be fine, and not too cold, I spent in testing six injectors on old "Ayesha," covering a distance of over five miles. Believe me, I could have done with a cushion on the hard seat-board during the last few laps ! Christmas on the full-sized railway was just like Sunday, except that there were a few trains usually running in what would be the Sunday church interval. It puzzled me why the trains should quit between about 10 a.m. and 1 p.m. on Sundays, whilst the horse-drawn tramway cars and omnibuses kept on running ; but a lot of quaint things were common in Victorian days. For all that, I reckon we were far better off during that period, than we are now. The first Christmas I spent at the locomotive sheds, I took the 1 p.m. to 8 p.m. turn of duty, and cleaned a little "Terrier," No. 54 *Waddon*, due out on the East London just after 5 p.m. I ate my Christmas dinner, a little apple pie made in a saucer, about three o'clock, in the cab, with the firehole door open, and it was quite cheerful. After the engine went out, I wandered around the practically deserted sheds, and found 204, *Westminster*, a Stroudley rebuild of Craven's design, due to go back to Eastbourne with a late evening train ; had a chinwag with the Eastbourne driver and fireman, helped the former oil up, and thoroughly examined the engine, which had double frames and outside cranks. The driver said that though nearly worn out, and rather noisy, she could steam, pull, and run very well indeed ; much better than the new Billinton bogie engines.

All Dressed-up

Childhood Christmas days were no different from any others. Being so poor, such things as turkeys, puddings, and other Christmas fare, were beyond our means. On two or three occasions I was invited to schoolfellows' parties, but did not go, as I was ashamed of my poor threadbare clothes among all their finery, except on one occasion ; and thereby hangs a good laugh. Readers who followed my reminiscences may recall that one winter evening, when on my way to visit my driver friend, I was drenched right through to the skin by a sudden rainstorm ; and his wife, a motherly soul hailing from Lancashire, put me in a hot bath and found me some dry clothes. These had originally belonged to her daughter, now grown up, and away from home in domestic service ; and as they fitted me

(Continued on page 680)

** Rejuvenating Grandpa **

by "Artificer"

Some Practical Notes on the Repair and Restoration of Old Clocks

AFTER careful examination of the escapement components, and necessary attention thereto, all the other wheels and pinions should be dealt with in turn. It is, generally speaking, unlikely that any bad signs of wear will be found in the teeth of the gear-wheels, except in inferior clocks where poor material, or inadequate thickness of the wheels, has been the obvious cause ; but sometimes one encounters quite good clocks in which the wheel teeth have been damaged accidentally, or by careless handling, as distinct from fair wear and tear. In such cases, it is obvious that the restoration of the wheel teeth to their original accuracy is essential before the clock can be put in proper working order ; it has been known for clock repairers, in the good old days of hand craftsmanship, to replace defective teeth, or even sectors of the wheel rim, by brazing in new metal and filing the teeth to shape by hand. But the skill necessary for such exacting work is rare nowadays, and it would probably be found much easier to cut a completely new wheel, using methods which have been described in *THE MODEL ENGINEER* on various occasions. Fortunately, however, it is very unlikely that the necessity for such extensive replacements will arise.

Signs of Heavy Wear

The pinions, on the other hand, often show signs of heavy wear, the parts of the teeth which have been in contact with those of the gear wheels being deeply grooved. As the pinions are always much wider than the gears, it is possible to deal with this, in most cases, by shifting the wheel on its arbor by a distance equal to its own thickness, thus bringing an unworn part of the pinion into use. Most English clocks have the pinions cut from the solid, integral with the arbor (in modern practice, pinion wire is commonly used) and thus renewal of the pinion would entail turning up a completely new arbor and

recutting the teeth. Lantern pinions, built up with brass side cheeks and round pins for teeth, as shown in Fig. 5, are not much used in old English clocks, but may be found in imitation "Grandfathers" (mostly of Dutch or other Continental make) and also in American clocks. They have at least one advantage from the repairer's point of view—the teeth can be

replaced when worn, though this may not be as easy as it looks, and great care is necessary in punching out the worn pins and inserting the new ones. Piano-wire of exactly the correct gauge should be used, and before cutting the pins off, the length of wire should be very carefully straightened. A slight taper on the end of each pin will facilitate insertion, but the pins should fit firmly, without shake in either of the cheeks, when in position.

Sprockets

Chain - sprockets, which are used in certain types of clocks, often show considerable wear, sometimes to such an extent that the chains will not grip reliably. Many of these sprockets appear to have been cast to shape, without much subsequent machining or fitting ; but in restoring them to efficient condition, the use of milling and indexing gear on the lathe may be found desirable. Sometimes holes may be drilled around the sprocket and fitted with pegs to engage the links of the chain ; when it is necessary to renew these, be careful to shape the projecting part so that it does not interfere with smooth and free working of the chain. It may be found necessary to renew the chain itself, and if the pitch, or the shape of the links, cannot be properly matched, this may entail making new sprockets to fit the available type of chain.

Fusee chains are used in many of the older spring-driven clocks, but these do not engage in sprockets, and wear is not likely to cause trouble ; but they may break, and the renewal of the link pins may be a delicate job. The clock repairer, however, may derive some satisfaction from the thought that it is not so bad as repairing the fusee of a watch !

*Continued from page 604, "M.E.", December 9, 1948.

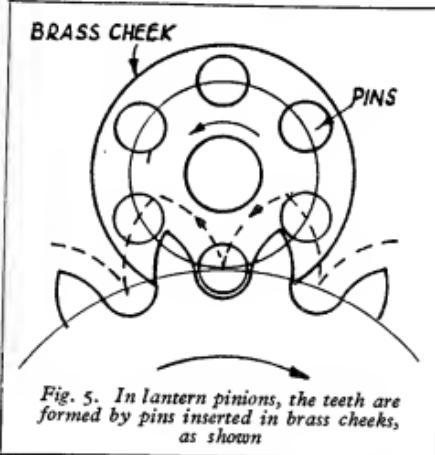


Fig. 5. In lantern pinions, the teeth are formed by pins inserted in brass cheeks, as shown

The gut line used for attaching the weights in the usual form of English long-case clocks is generally less troublesome than a chain, and has a most remarkable durability. It should, however, be carefully examined for any signs of weakness, and the breakage of a line carrying a heavy weight is a disconcerting occurrence in a quiet house, and may also damage the case. The pulleys over which the line runs should be examined, and if necessary, rebushed or repivoted so that they work quite smoothly.

The components of the winding gear are often badly worn, the common cause of trouble being the displacement of the pawl or "click" which engages the ratchet, due to wear of its pivot or distortion under heavy stress, so that it fails to hold reliably. Neither the diagnosis nor the rectification of this trouble is difficult; sometimes it may be found necessary to open out the hole in the wheel and make a larger pivot for the pawl, or to renew the latter, which should be made of tool steel, and hardened and tempered at the tip. Make certain that it is shaped so as to bed down properly into the ratchet teeth, and not bear only on its extreme point.

Assembly and Adjustment

Temporary assembly of both the going and striking trains in the frame plate, without the escapement or the strike control gear, will enable the efficiency and free running of the gearing to be tested. Quite a moderate effort on the main barrel in each case, should set the train running freely, without undue noise or roughness. Any tendency to grate is clear evidence that there is something wrong with the meshing of the wheels, and intermittent noise denotes either wheels out of truth, damaged teeth, or bent pivots. While such faults are present, it is hopeless to proceed with the final assembly of the clock, as it can never work satisfactorily unless its mechanical efficiency is high.

When the going train is finally set up, and the escapement roughly adjusted, it will be found that a pull on the line or chain will set the pallets rocking at a rapid rate, so long as the movement is in a fairly level position. The final adjustment must be carried out when the movement is fitted to the case, or at least attached to its seating-board, and properly levelled. In some clocks, the mounting of the movement is rather crude, consisting of two or more hook bolts which engage the lower pillars and pull the frame down on to the seating-board; it is better to fit small angle brackets to the frame, and thus avoid risk of distorting it when mounted. Warping of the seating-board is common in old clocks, and the remedy is obvious—a little treatment with the jack-plane, or the making of a new hardwood board, will put this right.

The case of the clock should stand firmly, and quite upright, as tested by plumbline, or a spirit level on the surfaces where the seating-board is mounted. If practicable, permanent fixing of the case to the wall is a great advantage—if only to protect it from the conscientious but misguided housewife who insists on shifting the clock every week to dust behind it! The importance of absolute steadiness on the reliable

working and accurate timekeeping of a good clock cannot be over-emphasised.

Pendulums

The pendulum of an English long-case clock is a very simple affair, and despite the absence of temperature-compensating devices or elaborate methods of adjustment, its timekeeping properties are generally all that can be desired. It usually has an iron rod—little more than a piece of thick wire, in many cases—and a large diameter, circular bob, streamlined in cross-section. The suspension is by a single leaf spring, anchored in a slotted lug on the back cock of the escapement, and this is the only part likely to be in need of attention. It may be bent or buckled, causing the pendulum to roll like a drunken sailor, instead of swinging like a guardsman's arms. Breakage of the spring is not very common, but when it is necessary to renew a suspension spring, the correct width and thickness of material should be used, and it should be of tempered spring steel. Other materials are sometimes tried by the amateur repairer, and work well for a time, but eventually become brittle and break, due to fatigue and crystallisation of the metal. Strip spring-steel for this purpose can be obtained from dealers in clockmaker's materials, and is generally above suspicion in respect of durability.

The lower end of the spring is riveted in a slotted brass cheek attached to the top end of the rod, and this joint must be quite firm, but not hammered up so unmercifully as to distort the spring or the cheek. At the top end, either a brass block or a double-headed rivet is attached to prevent the spring falling through the slot of the fixed bracket. It should, however, fit the slot closely, so that it cannot move sideways at the top end, but is free to swing edgewise and thus align itself to the plane of the pendulum relative to the back of the case. All these points are of great importance in the efficient working of the clock.

Out of Beat

The top of the pendulum-rod passes through a slot or fork on the end of the arm, or "crutch" on the escapement arbor, so that the rocking of the pallets causes the pendulum to swing; here again, the fit of the crutch should be close, but not tight, on the rod. When the clock is set up, with the case vertical and the seating-board truly levelled, the pendulum should swing an equal distance each way from its central position, to allow the pallets to unlock the teeth each side in turn. If this condition is not attained, the clock is said to be "out of beat," and will work inefficiently, if at all; the fault is easily detected by sound, the tick one way being accented and the other way subdued. Correction is effected by very slightly bending the arm of the crutch as required, taking care to keep the fork in line with the arbor, so that it does not bind on the rod.

Regulator clocks are commonly fitted with a scale-plate below the tip of the pendulum rod, which not only enables them to be set vertically on the wall without the aid of a plumb-line, but also serves as a check on the symmetry of the pendulum swing. It is also usual to provide an adjusting device on the crutch of the escapement

in these clocks, so that the beat may be set without bending the arm. The latter refinement is not easy to apply to a long-case clock, but it would be a simple matter to fit a scale, or mark the back-board of the case, to check the angle of swing.

Robust clock movements, such as those of grandfather clocks, usually have a swing of five degrees or more when in good working order; regulators have about four degrees, and some high-class French clocks, such as those of the Empire period, with ornate ormolu cases, have

a very small swing—not more than about two or three degrees. A small swing is conducive to good timekeeping, economy of power, and long wear—but it makes the movement very delicate, and subject to derangement with the least interference to mechanical adjustment or levelling.

On the other hand, cheap clocks often have an over-exuberant action—generally due to the use of excessive driving power to overcome faults in design or construction—which produces a large arc of pendulum swing and plenty of noise, resulting in poor timekeeping and rapid wear. The old French "Tic-tac" clocks, with very short pendulums and crude escapements, which were once common, are typical examples.

Generally speaking, a long pendulum-rod and a heavy bob are conducive to good timekeeping, though of course good mechanical design is also highly important. One of the greatest advances in clock design was the change-over from the old verge, driving a folio or a short, quick-acting pendulum, to the anchor escapement and the "Royal" pendulum, as it was then called, with its effective length of one metre, to give a one-second beat; and after nearly 300 years, this length of pendulum is still very difficult to improve upon for general use in domestic clocks. Apart from anything else, the rating adjustment of a short pendulum must necessarily be very critical.

In addition to adjusting the beat of the pendulum, it may be found desirable to adjust the "drop" of the pallets to obtain the most efficient impulse. This is done by raising or lowering the

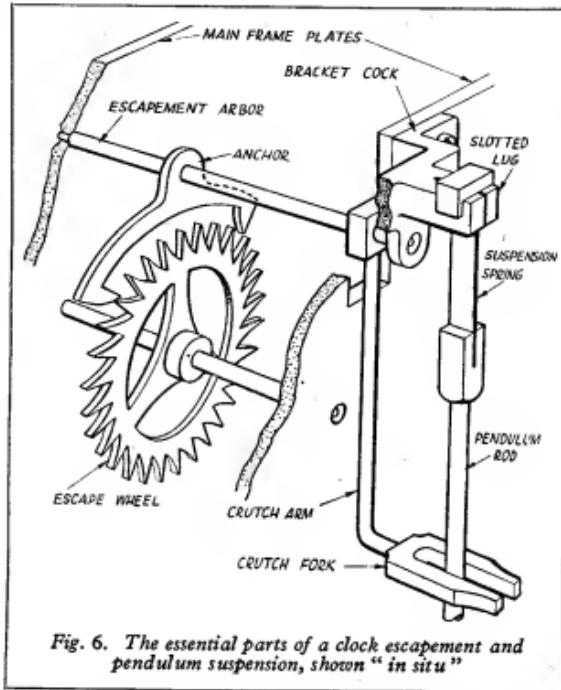


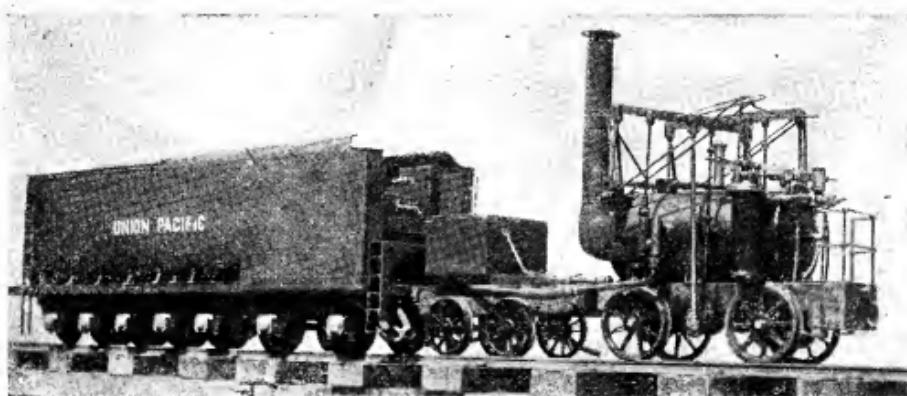
Fig. 6. The essential parts of a clock escapement and pendulum suspension, shown "in situ"

power absorbed in producing this is excessive. Experience—which, of course, can only be gained by practice—is the only sure way to proficiency in adjusting this and other delicate parts of a clock. Though details of the escapement may vary, the drawing, Fig. 6, is typical of practically all standard types of clocks.

Sometimes it is found that a clock with a very weak and uncertain beat can be considerably improved by increasing the strength of the driving power—such as by adding to the weights. The temptation to take this easy and obvious way out should be resisted—brute force never produced a good clock yet, and it is far more likely to result in overloading and causing heavy wear of the working parts. If a clock will not work by the application of the normal power, it is obvious that its mechanical efficiency has fallen off for some reason—and that reason should be sought and dealt with. Unfortunately, there is evidence that some of the clock repairers in the past have not been over-scrupulous on this point, and probably under the urge to do a quick, cheap job, have replaced the original weights of clocks with heavier ones, to the eventual detriment of the clock movement.

The rating of the clock, to ensure that it keeps correct time, is of course effected by adjustment of the pendulum nut, but that need not be considered during the mechanical adjustment of the movement, and as a matter of fact, it can only be set correctly by patient observation of the rate of the clock over a substantial period.

(To be continued)



The U.P. tender and "Puffing Billy"

ANCESTORS

An Imaginary Conversation

by Edward Adams

Owner : Curly suggests that I put you two together to see how you look on a photograph. You are distantly related, but the family likeness is not very obvious in your appearance.

U. P. Tender : Related, did you say, to a bundle of scrap iron like this? I should be ashamed to let my real locomotive see me in this position. Why, this old fellow couldn't pull me a yard.

Puffing Billy : Ah, me! Perhaps I am old and worn out. Maybe I can't pull you now, but there was a time young fellow, when I should have had a good try. I worked for about 50 years and wore out three boilers.

U.P.T. : You old chaps are back numbers, out of date, always raking up old memories. Why, it must be nearly a 100 years since you and your sister Wylam Dilly did any useful work, and then it was only a few small coal wagons on a rickety track at about five miles an hour from Wylam to the Tyne. I can't think how you managed even that on 50 lb. pressure. I guess you needed sand on the rails.

P.B. : William Hedley suggested ashes, made on the spot, you see.

U.P.T. : It seems to me that the world is littered with out-worn gadgets. Look at all this Air Ministry surplus. Must have cost fortunes to make, and now all scrap, selling dirt cheap. A waste of money, I call it.

P.B. : Not a bit of it. The best thing that could happen to it. Think of all the young fellows who are able to afford, for the first time

in their lives, a beautiful piece of mechanism; their eager minds considering how it was made, how it worked and how it can be altered or improved, setting 'em alight. Out of that will come many fresh ideas, you may be sure. As for being out of date, look to yourself. Your locomotive may well be a thing of the past in a few years, what with jet propulsion and the use of atomic energy. . . . Did you ever hear how I worked on a boat?

U.P.T. : On a boat, eh? Ha, ha! You make me laugh.

P.B. : Yes, my boiler and engine were taken off the wheels and I was rigged up with paddles and put in a coal barge, but I got back on to rails in six or eight months.

U.P.T. : That must have been a very funny sight. Seriously, though, you are only a simple beam engine, perched on a pot boiler. I declare your frame is made of timber, and what is that queer-looking carriage attached to you.

P.B. : My tender, you mean. You ought to recognise your ancestor. It serves exactly the same purpose to me as you do to your ladyship. A water tank, which, by the way, used to be an oak barrel, and a small container for coal. When you work for a colliery you don't need to carry much coal about with you.

U.P.T. : Sort of "taking coals to Newcastle," eh?

P.B. : You may laugh, young fellow, but a man named George Stephenson used to come to watch me at work. He was only young then,

collecting ideas and learning to become a famous engineer. You may have heard of him.

U.P.T.: Yes, of course, but what on earth could Stephenson have seen in you to interest him?

ment. You, for instance, racing across a Continent at anything up to 80 miles an hour.

George also saw the power of the heavy blast from my cylinders, so that the harder I worked, the more steam I made. If it wasn't for that idea, your modern locomotive would not have been possible.

U.P.T.: I'm told that your blast got you into trouble and you had a narrow escape of being put down as a nuisance.

P.B.: Yes, but we remedied that by fitting an expansion chamber which evened out the exhaust. Rather like a motor-car silencer, but long before motors were thought of.

Sparks, which set the hedges and grass on fire, were arrested or baffled by a cowl on the smoke stack. Your modern American locomotive does it with wire mesh or perforated plates in the smokebox. Then again, George saw that my valve-gear was not perfect; when he came to make a locomotive he used a better, and it may be even today, the best kind of valve-gear ever invented, and which bears his honoured name.



Tony Hedley with "Puffing Billy"



Tony Hedley and "Monstrosus" at Falls Grove Railway, blowing off at 70 lb.—Photos by his father

P.B.: He probably learnt that it was not necessary to have rack-rails and tooth wheels in order to pull a load, because I was probably the first working locomotive to have smooth treads and rails. My maker, William Hedley, found that out by himself by experimenting on the wagonway at midnight and in Christopher Blackett's garden, with a carriage propelled by men. He decided that if men could move themselves and the carriage loaded with weights on smooth treads and rails, it would be possible for my engine to do the same and haul a load as well.

It was all very secret, I expect William was rather sensitive of being laughed at in case his ideas didn't pan out in practice. No doubt the men were asked to keep it dark—especially from their wives—can you imagine their puzzlement, winding themselves to-and-fro on the short track.

"The gaffer must be queer int' 'yed,'" they'd say, shaking the sweat off their own, little knowing what would come from their experi-

My boiler is not, as you say, a pot boiler. It has a return flue inside, which explains why the chimney is at the same end as the firedoor.

The "Iron Horse," people called me, because I did the work of several horses.

U.P.T.: You don't look much like a horse; in fact, you had to stop working when horses were in sight because you frightened them. A horse has a head and a tail, at any rate. Which reminds me, I don't know which is your front end; you have the engineman at one end and the so-called tender at the other, with your fireman and chimney in the middle. I don't believe the photographer knows either. You remind me of the small boy who had his trousers on backwards and didn't know if he was going to school or coming home.

P.B.: Well, as I was about to tell you when you interrupted. After a good deal of experiment, Stephenson was able to improve on my design. As any schoolboy knows, he simplified the engine, doing away with the beams, rods and spur-wheels and joining the pistons and connecting-rods directly to the driving-wheels.

But what so many people don't know or do not appreciate, is that George owed a great deal to the thought and care that had gone into the making of me. He saw that I really did a job of work

and he was not too proud to learn all he could from the work of William Hedley. William was not really an engineer by training. You might say he was an amateur. In these days he would very likely be a model engineer and have a small workshop and very little spare time to work in. But William had rare common sense and had the courage to try things out for himself, so that a hundred years later he is called the "Father of the Modern Railroad System." And that is how you and I come to be related.

U.P.T.: Well, we had better move on or be run down by the locomotive I see rapidly approaching. A very young driver to be in charge, don't you think? Who is he?

P.B.: You wouldn't know; he is Tony Hedley, aged 7, and his ancestor is the same William we have been discussing. "A chip off the old block," as you might say. He isn't like you; he has too much respect for my old bones to run me down. "Why, that's Great-Great-Grandfather's engine," he said, when he first saw me.

A Christmas Lobby Chat

(Continued from page 674)

all right, she said I could keep them if I wished, bringing out the girl's discarded coat as well, a brown cloth one with a deep fur collar. Good reader, if you have ever had the misfortune to shiver through a long cold winter in miserably inadequate patched-up rags, you'll maybe appreciate one reason why I accepted with alacrity. My long curls, treble voice, and general personal appearance, matched up exactly with the outfit, anyway; and I'd never before experienced such warmth and comfort!

The Bad Girl of the Family

It so happened that one of my few school friends had removed to a new home in West London, and had invited me there to spend the Sunday before Christmas, saying he would meet me at Hammersmith (District Railway) station to show me the way. In those days it was considered risky for a young girl to travel alone; and a kindly porter at the Underground station at Victoria, mistaking me for a young Victorian miss in my new regalia, escorted me into a first-class carriage in which were two elderly ladies. As the train pulled out, one of them turned and superciliously surveyed me from head to foot through a lorgnette (pair of specs on the end of a stick), then turned to her companion

and remarked audibly that "she didn't know what parents were coming to nowadays, allowing such children to travel alone." I tried to keep a straight face, but I guess it must have slipped, for she immediately started leading off at me, calling me impertinent, brazen-faced, and goodness knows what else, and I would certainly come to a bad end, and so on. She kept it up at intervals all the way to Earls Court, where they both got out; and by that time I was quite convinced that I really must be the bad girl of the family! However, I had a good laugh over it between there and Hammersmith, and then my pal went and completely crowned the whole show; for as soon as he saw me at the ticket barrier he yelled out "Hallo, darling!" flung his arms around my neck, gave me a resounding kiss, stuck his arm through mine, and marched me off with all the pride of possession imaginable, to the great amusement of the other passengers and the ticket-collector.

Ah, well! A smile is one of the best tonics in this drab and unsettled world of today. I hope my Christmas lobby chat has raised one, and will conclude by wishing all followers of these notes the compliments of the season (first class all stations, at that) with a special wish for the success of all the little locomotives they build to my instructions. Cheorio!

Editor's Correspondence

A Quick-Change Gearbox

DEAR SIR,—I have received a number of letters dealing with my recent article on the Quick-Change Gearbox.

Although I shall reply to all these readers, I am afraid that I shall have to disappoint them, because to prepare the drawings and notes to satisfy all these readers would be a well-nigh impossible task, in the limited spare time I have at my disposal.

The situation obviously calls for a second article; but to do this would be to tread on dangerous ground, as the gearbox is not of my design. As I mentioned in the article it was designed by an American engineer and the design is the property of this gentleman's firm.

I purchased my set of drawings well over a year ago and have since disposed of them, but it is possible that they can still be obtained in the U.S.A.

The address of the firm is as follows :
The Stevens Engineering Co., 2604, Military Avenue, Los Angeles, 34, California, U.S.A.

The gearbox was advertised as adaptable to the "Craftsman," "Atlas," "Sheldon," and similar lathes. The cost of the drawings was \$3.75.

If the drawings are still marketed, I do not think that readers should have much difficulty in obtaining them under the present conditions. (When I purchased my set, I had to obtain the necessary permission to send the money out of the country, and then it took about three months for the drawings to arrive.)

I trust that the above information may prove of some value and help to ease the situation.

Yours faithfully,
E. STEPHENS.

Liverpool.

Grandfather Clocks

DEAR SIR,—I feel I must write my first letter thanking you for the article called "Rejuvenating Grandpa."

I have always been keen on model engineering; when I was 10 years of age (I am now 50) I made a working model coal-mine, but in those days, one could not purchase bits and pieces of metal as easily as one can today. I made it completely of wood but machined it all as metal. May I mention that I won numerous "firsts" with the model.

For quite a number of years, I have studied horology (I still maintain the timepiece is the finest piece of engineering produced) and have made several clocks. But my greatest feat started in 1947, when a friend called on me with a sack of old twisted junk, which he tipped on the floor asking "Do you know what this lot is?" He got me puzzled, but I saw amongst the assortment, various clock wheels, flets, and pinions.

He then told me it was once a grandfather clock, which was originally made to represent the British Clockmaking Industry at the Paris Exhibition.

Unfortunately, during the blitz on London, the house in which it originally stood was hit by a bomb. After six months, the remains of the clock were dug out of the rubble and that is how it was brought to me.

Now, as my workshop is the kitchen and my bench the kitchen table, I set about rebuilding the clock, with only a 1½-in. Flexispeed lathe to help true bent pinions, etc.

Eventually, I got the kinks out of the dial and the twists and buckles out of the plates, which are, by the way, 12 in. × 8 in. × ½ in.; but the problem was the case. I then started to collect bits and pieces of mahogany, and had eventually accumulated an old gramophone cabinet, two washstand backs (tiles removed), commode, firescreen, table leafs, tea tray (for the moulding), cornice pole (for the pillars), an old penny-in-the-slot lock for the brass work on the pillars and other numerous bits and pieces.

Now after two years, without any outside help, I have a magnificent grandfather, standing 9 ft. high × 2 ft. wide × 16 in. deep and weighing 2½ cwt. It strikes the quarters on tubular gongs. Its value by insurance assessment is £500. I'm only a painter at a local builder's.

Yours faithfully,
Farnham, Surrey. W. WOOD.

Removing Rust

DEAR SIR,—"Artificer's" anecdote of the good lady who was exhorted to boil the "innards" of the family clock has reminded me of a useful method of removing rust from iron and steel, which may be unknown to some of your readers. This method is of special value for articles of complex shape, which are difficult to clean by the usual methods.

Make a fairly strong solution of ordinary washing soda and water (the exact strength is not important), in an old saucepan or other convenient vessel. Immerse the article to be cleaned, add a few pieces of scrap aluminium, and boil the solution. In a short time the rust will be seen to turn into a black deposit.

When all the rust has turned black, remove the article and scrub with a stiff brush; rinse in clean water and dry at once.

For those who are interested in the mechanism of this process, it is as follows :—

The aluminium and soda react, and hydrogen is evolved. This hydrogen is in a very active condition and combines with the oxygen in the rust to form water, leaving the iron in the rust as a black deposit of finely divided iron which can be brushed away.

Warning.—Do not perform this operation in an aluminium saucepan, as it will almost certainly "do it in."

A diluted solution of caustic soda may be used in place of washing soda, if desired, in which case the action will be quicker, but if you do use it, be careful—caustic soda is very spiteful stuff!

Yours faithfully,
London, S.E.9. A. L. HUTTON.

A Seismograph

DEAR SIR.—As readers of THE MODEL ENGINEER seem to have some knowledge and experience of practically all arts, crafts, trades, and sciences, I should like to know whether any reader has ever made, and put into use, a seismograph. If so, can he illustrate its construction and application, and state whether the installation of such an instrument would be feasible within 50 yds. of a main road.

I cannot recollect having seen anything on this subject in THE MODEL ENGINEER during the past 15 years or so—literature on the subject appears to be rather scanty—and on my last visit to the Science Museum at South Kensington I could

secure no information on the instrument, as the one I was told existed had not been restored from its war-time evacuation.

Yours faithfully,
Maidstone. R. HOLLIS.

From "Uncle Jim"

DEAR SIR—I send my greetings to all model engineers both at home and abroad. As a rule, I receive so many letters and cards that it is impossible to anticipate them all, and I have always a soft spot for the lone hand overseas.

Yours very truly,
London, N.12. J. C. CREBBIN.

Club Announcements

Ickenham and Ruislip Model Club

At almost every meeting recently we have enrolled one or two members. We feel that if we can only find a more suitable meeting place with facilities for our own workshop, it will be a greater incentive for new members, and the chairman and secretary are sparing no efforts to find such space. Whilst we can give no immediate promise of anything definite, we hope to be able to make an announcement shortly in this connection, which we are sure will be welcomed by all.

On Sunday, December 5th, fourteen members paid a visit to the London Midland Region Locomotive Sheds, at Camden, and a very interesting and pleasant time was spent among the locomotives in the sheds and also in the repair shop, where some rods were being remelted.

Hon. Secretary: H. C. PIGGOTT, "Chatsworth," Parkfield Road, Ickenham, Middx.

Chichester and District Society of Model Engineers

The above society's exhibition will be held at the Assembly Rooms, North Street, Chichester, during the week commencing February 14th, 1949. It will be opened at 3 p.m. on the Monday afternoon, by His Grace the Duke of Richmond and Gordon, and public admission will commence at 5 p.m. on that day. A very generous prize-list encourages the hope that large entries in all the competition sections will make it a memorable event. Entry forms are available, and all who are interested are invited to apply to W. G. S. PORE, 7, Willowed Drive, Chichester, Sussex, who will be pleased to send details. We hope that all Southern clubs at least, will be represented.

Radio Controlled Model Society

The next meeting of the London Group of the R.C.M.S. will be at St. Ermin's Hotel, Caxton Street, S.W.1, at 2 p.m., on Sunday, January 9th, 1949, when Mr. Christopher Terry will speak on and demonstrate 485 megacycles gear and intermediate gear. Members and visitors will be welcome.

Hon. Group Secretary: LUXUR. (L.) G. C. CHAPMAN, R.N., Pine Corner, Heathfield, Sussex.

Grimsby and District Society of Model and Experimental Engineers

Our fifth exhibition, which took place at the Augusta Street Barracks, from November 22nd to 27th inclusive, was a great success. Over 7,000 visitors passed through the hall in that period. Every section of the hobby was represented, particular interest being shown in the race cars. The 30-ft. enclosure was thrown open each evening to witness Mr. Moorby's M.C.N. Special, circle the track at 60 m.p.h. whilst the smaller diesel-engined cars were no less appreciated. This was alternated for the benefit of the aircraft enthusiasts by some sparkling line-control demonstrations from a variety of powered "planes." The 2½-in. gauge passenger-carrying railway was kept busy giving the youngsters their debut in "live steam" and the airline-operated models had their own enthusiastic audience. A feature of this was a model "Booster Pumping Station" which gained for Mr. Pearson the Championship Cup. The ship section was well represented, Mr. Grose taking the first prize with his model G.P.O. cable-layer *Monarch*, followed closely by a finely detailed model trawler. The tool and woodwork section contained some very nice work and the locomotives caused the judges many a headache. Among the miscellaneous items was an articulated

low loader with full working differential and correctly clipped and shackled leaf springs which well merited a first prize. In all, over 300 exhibits were on view, including a full-size "Derwent" jet engine and other items kindly loaned by the R.A.F.

The society can look back on a year of progress, membership continues to increase, land has been acquired and a multi-gauge railway is in course of preparation. Many interesting visits have taken place and all this, crowned by a successful exhibition, has placed the society in a very favourable position.

Hon. Secretary: J. TARTTELIN, 101, Ladysmith Road, Grimsby, Lincs.

The West Hartlepool Society of Model Engineers

The fifteenth annual general meeting of the above society was held on Saturday, December 4th, 1948, at Birk's Cafe, when officials were elected.

The hon. secretary reported that the membership to date was 39 and that a revised list of members would be compiled shortly. During the session, the society took part in various regattas, exhibitions, works visits, etc., and it is planned to hold an exhibition some time in 1949.

The society is at present assisting in the local British Railways Charity Exhibition and the Town Planning Exhibition, and refitting the workshop at Back Park Avenue, where it is hoped to obtain improved lighting in the near future.

Hon. Secretary: J. F. TAYLOR, 44, Shrewsbury Street, West Hartlepool.

Merseyside Live Steam and Model Engineers

The officers of the club have an interesting programme of lectures on varied topics for forthcoming meetings.

The club meets every other Wednesday at the clubroom, Cooper's Buildings, 12, Shaw Street, Liverpool, 6. Visitors are welcome at any meeting.

The Annual General Meeting will be held on January 19th, 1949.

Hon. Secretary: A. F. DUCKITT, 145, Bowring Park Avenue, Liverpool, 16; or F. C. BRAILSFORD (Chairman), 3, Rydal Avenue, Prescot, Lancs.

NOTICES

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